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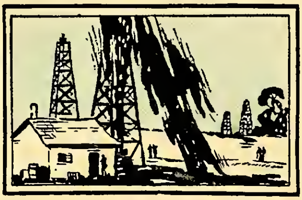

Old Louisiana Live Oaks

* * *

What Shall We Do With the Lands?

* * *

Review of Fish Farming Industry

* * *

Natural Gas Reaches High Production Level

Published Monthly by the
DEPARTMENT OF CONSERVATION

FEBRUARY
1932

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VOL. II. NEW ORLEANS, LA., FEBRUARY, 1932 NO. 5

Secret of Paper Preservation Discovered in Fibre Purity

THE purity of fibre content, based on degree of cellulosic and non-cellulosic content, is apparently the significant factor in rate determination of paper, the U. S. Bureau of Standards declared July 1, in reporting its progress in research in preservation of records.

The Bureau, in conducting the study, has made tests of thousands of publications in libraries, of ages running back as far as 100 years.

The statement of the Bureau follows in full text:

Satisfactory progress is being made at the National Bureau of Standards in studies of the preservation of written and printed records, according to Director George K. Burgess, of the Bureau of Standards, Department of Commerce.

Thorough tests of the relative permanence of the current commercial writing and printing papers have been completed. These indicate that there are papers made from both rag and wood fibres which are suitable for any required degree of permanence, providing the papers are stored under favorable conditions. A classification of papers relative to the varying degrees of permanence required is suggested, the grading being in accordance with their degree of cellulosic and non-cellulosic purity. This is apparently the significant factor in respect to deterioration.

Tests have also been made of over a thousand old publications that have been stored in public libraries for varying periods during the past 100 years. These tests, like those of the current papers, reveal the importance of fibre purity. Papers containing crude fibres, such as ground wood and unbleached fibres, were generally brittle and yellow, while those containing fibres well purified by chemical treatment, were generally in good condition.

The results of a survey of 33 public libraries, and similar depositories in various regions of the United States, indicate that acid pollution of the atmosphere is the chief external deteriorating influence. Sulphur gases from combustion of fuels, high temperatures, variations in atmospheric humidity, light, and dust are among the principal causes. Laboratory studies of these influences have been initiated. Exposure of papers to an atmosphere containing sulphur dioxide has shown this gas (which is a product of ordinary combustion) to be a very potent deteriorating agent. Rosin sizing materials used in paper manufacture were discolored on exposure to light, which is further evidence that they are one cause of discoloration of paper.

The studies of current papers are being made in cooperation with the Brown Company, who are maintaining research associateship at the Bureau for the purpose.

Louisiana Conservation Review

Published monthly by the Department of Conservation in the interest of protection and proper utilization of Louisiana's natural resources.

JAMES P. GUILLOT . . . . Editor
N. E. SIMONEAUX . . Assoc. Editor
WM. G. RANKIN . . Business Mgr.

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Legion Sponsors Highway Beautification and World War Memorial Plan

Louisiana Paved Highway Beautification and World War Memorial Plan of the Louisiana Department, the American Legion

The Louisiana Department of the American Legion, cooperating with the American Legion Auxiliary, has a plan inspired by the systematic highway beautification of France, to beautify the paved highways of the State, which has been approved by the Louisiana Highway Commission, the Louisiana Department of Conservation and the Louisiana State University Extension Bureau, who are actively aiding in its execution.

The Louisiana Department of the American Legion volunteers to undertake the planting of native Louisiana trees along the new paved highways, as a living memorial to the Veterans of Louisiana, who gave their lives in the World War; the trees to be supplied by the Louisiana Conservation Commission and maintained (when planted), by the Louisiana Highway Commission. It is proposed that suitable dedicatory ceremonies be held in each of the eight Districts and addresses delivered by State and Legion officials.

The Plan

1. The American Legion will create public interest through the press, by radio, bulletins, and through Legion Speakers.

2. A definite, practical tree planting program will be carried out in the month of February, 1932, with the cooperation on, and aid of the American Legion Auxiliary, the County Agents, Home Demonstration Agents, 4-H Clubs, the Schools, the Boy Scouts of America, and major civic organizations. As their contribution to the Washington Bi-Centennial Program, the American Legion proposes to register the individual trees planted this year, with the Washington Bi-Centennial Commission. It is fitting that the Louisiana World War Memorial tree-mileage of the spring of 1932 be in-

(Continued on page 33)

Trees For Washington

Reprinted from Nature Magazine, November, 1931

TWO HUNDRED years ago, come next February, a child was born to a family of Virginia aristocrats who was destined to lead a rebellious people through many sombre crises, to aid them in the formation of a republican form of government and to preside over that new-born democracy in its first faltering years. Next year the people of the United States will do honor in various ways to the memory of George Washington.

Naturally the observances which will be held will take many forms. That there may be some coordination of effort, and that helpful suggestions and programs may be made available, the George Washington Bicentennial Commission was authorized and endowed by Congress. It seems to us, however, that one of the most appropriate activities in honor of Washington is that delegated by the Commission to the American Tree Association.

For some nine years this Association has carried on a national campaign of education as to the importance of trees, individually and collectively. It has sought to plant in the minds of Americans that as they use forests they must plant them; that protection of forest resources against careless fires is a national responsibility; that he who plants one tree or many trees has done a constructive and creative act. All this has been done through the vision and under the leadership of Charles Lathrop Pack, President of the American Tree Association, whose steadfast purpose in behalf of our forests has never faltered.

So to the American Tree Association has been given the task of bringing about the planting of ten million trees, each and every one dedicated to the memory of George Washington. To this end the organization has enlisted the cooperation of individuals, women's clubs, civic groups, organizations of young people and societies of many kinds. It has published a tree-planting book adapted to this particular campaign and distributes it free to all who ask for it. It presents—likewise free—to all who plant, a certificate of membership in the growing army of George Washington tree planters.

And the most surprising thing is that already, even before the bicentennial year has come, nearly eight million trees have been registered and will be dedicated next year to our first President. Obviously the ten million mark will be reached and passed. Perhaps twenty million young trees will reach their roots into the ground and their limbs toward the skies in honor of Washington. Many acres of idle lands will be transformed into growing forests through the stimulus of his leadership in the dark days of revolution—a leadership of that enduring quality inherent in greatness. Thousands of individual trees, including one planted on the White House grounds by the President of today, will stand as a symbol of the great general and statesman.

One hundred years hence, when the tercentenary of the birth of Washington is observed, these trees will have grown to large size with ample shade. Perhaps some of the forest trees will have been cut to supply the needs of our people and new trees will be growing in their places. There is a special appropriateness in such a memorial that lives and grows, particularly when it is dedicated to an achievement that also still lives and grows.

George Washington believed in the building of a national government and a nation as nearly sufficient unto itself as possible. This meant the creation of resources sufficient for emergency. It meant the conservation of resources, and one of the most vital of these is our forests.

While the planting of ten or even twenty million trees, many of which will be in groves and individual plantings, may not materially add to our forest reserve, they will accomplish one thing. These plantings will focus the attention of our people on the need of reforestation. Thus in this program of commemoration is to be found an educational movement of immense value; an activity which certainly Washington would heartily approve.

So let us grasp this opportunity; let us treble, if we can, the original goal of ten million Washington trees. Let us render, through this means, honor to this man whose gift to the progress of the freedom of man and to the erection of a democracy cannot be dimmed by the passage of time.

How Old Are The Live Oaks?

By EDWIN LEWIS STEPHENS

(Reprinted by Courtesy "American Forests.")

I AM perplexed with conflicting evidence in regard to the probable age of the largest live oaks we have in Louisiana.

What shall we say of live oaks that measure eighteen feet, twenty-two feet, twenty-seven feet, and thirty-three feet in circumference? I have recently measured many large specimens, including the following: The two great live oaks in front of Colonel Boyd's residence on the old university campus in Baton Rouge, one of which measures eighteen feet, the other fourteen feet, in circumference; the great central live oak in the American graveyard in Natchitoches, seventeen feet, two inches; the large oak at the Protestant Cemetery in Lafayette, seventeen feet, six inches; the two trees on Twin Oaks Farm five miles north of Carencro, sixteen feet, one inch, and eighteen feet, three inches; the big oak in Broussard, eighteen feet; the G. A. Martin oak in Lafayette, eighteen feet, three inches; the monarch of Paradise Grove at Breaux Bridge, nineteen feet, two inches; the one in Father Rochard's yard at Breaux Bridge, nineteen feet, eleven inches; the great live oak at the Lafayette Cathedral, nineteen feet, and the one in the Cathedral cemetery, twenty feet, six inches; the curious

Surpassing them all in majestic beauty, grace and size, the live oak in St. Martin Parish measures thirty-three feet four inches in circumference. It is eighty-seven feet high and has a spread of 135 feet. This photograph was made September 28, 1930.

The Gebert live oak, on beautiful Main Street in New Iberia, Louisiana. Its planting in 1831 is of authentic record. This magnificent tree stands directly on the main line of the old Spanish Trail and is admired by thousands of tourists each year.

Among the most famous of Louisiana's live oaks is this veteran at Lafayette Cathedral, nineteen feet in circumference, photographed in June, 1928.

series of oaks on the shell beach at Charenton standing ten feet above the ground on their roots, having been washed out by flood, now resting on mussel shells, the largest of which measures twenty-feet, four inches; the oak on the grounds of the public school at New Iberia, twenty-one feet; the Gosserand Oak on False River, twenty-one feet, five inches; two neighboring oaks on Avery Island, twenty-one feet, three inches and twenty-one feet, seven inches; the great live oak on Avery Island, twenty-two feet; the one on Jefferson Island, twenty-two feet, two inches; the one at Kenner ferry, west bank, twenty-two feet, two inches; the Stonaker oak in Pointe Coupee Parish on the Mississippi River near New Roads, twenty-two feet, two inches (this oak is photographed in the April, 1930, number of the NATIONAL GEOGRAPHIC MAGAZINE as being in St. Francisville on the grounds of the high school, and much sentiment is wastefully indulged over the generations of children playing on its limbs!); the great whitewashed live oak on the southwest corner of the public square at Breaux Bridge, twenty-three feet, seven inches; the New Roads live oak on the grounds of the old Poydras College where James Ryder Randall wrote "Maryland, My Manyland," twenty-three feet, five inches; the great double tree east of the Teche at Parks, twenty - seven feet; the famous "Seven Sisters" on the Lastrapes place near Washington, in two clusters measuring approximately twenty-seven feet each; and finally the Arnaud Robert live oak six miles above Breaux Bridge, west of the Teche, thirty-three feet, five inches. This tree is eighty-seven feet high and has a spread of 135 feet. So far as I know it is the largest live oak in existence.

Now it is claimed for many of these oaks that their age is anywhere from 200 to 1,200 years! Mr. Edward A. McIlhenny informs me that the big live oak on Avery Island was estimated to be between 1,100 and 1,200 years old by the great

The Stonaker Oak, with a circumference of over twenty-two feet, stands in Pointe Coupee Parish on the Mississippi River near New Roads. This photograph was made in December, 1930.

This is the monarch of Paradise Woods, a grove of live oaks near Breaux Bridge, Louisiana, the mecca of artists because of its impressive beauty.

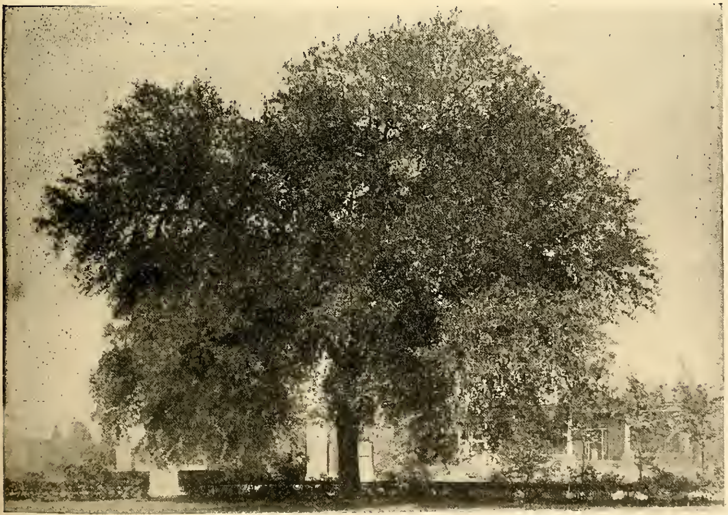
British botanist, the late Henry John Elwes, F.R.S. On the occasion some ten years ago when Elwes visited Avery Island, Mr. McIlhenny cut down for him a much smaller tree and made a cross section, which Elwes examined with a magnifying glass and found to have nearly a thousand annual rings. Mr. McIlhenny states that he himself recently counted the rings from the cross-section of a much smaller tree on the Island, showing 429 years of growth.

Mr. Frank E. Neelis, Superintendent of the Audubon Park Commission, New Orleans, writes me that the live oak trees in Audubon Park are from 200 to 300 years old. But obviously it goes without saying that no avenues of live oaks were planted at New Orleans previous to its founding by Bienville in 1718. Col. Thomas D. Boyd, President Emeritus of the Louisiana State University, tells me of legends to the effect that the two great oaks in front of his house are hundreds of years old and date back to the time when Baton Rouge was the Indian village of Istrouma. But again one may exercise incredulity over the possibility of the Indians planting two trees mathematically located so as to be directly in front of the residence of the commanding officer of the United States Army Barracks erected years later at that point on the river bank.

How old a large individual live oak may be when it is so placed that the probability is in favor of its having been planted by Nature rather than by man, is a matter of conjecture. The great live oaks in cemeteries may possibly have been standing at the time the cemetery was founded, but the reasonable probabilities are that cemetery live oaks are only a few years older than the cemetery itself. Therefore, since this country was settled only two centuries ago, we cannot expect to find trees planted by civilized men that are much over 200 years old.

Based upon measurements of many of the largest live oaks in Lou-

(*Continued on page 32*)



The Robert Martin oak, first of the eighteen known as the Century Oaks because they were planted on the first day of the twentieth century, January 1, 1901, on the campus of Southwestern Louisiana Institute. This phoograph was made on May 6, 1931.

BIRD-BANDING

By J. D. LAFLEUR

BIRD-BANDING in the United States has become a very extensive field of research for valuable information concerning bird life in this country. History tells of a falcon caught in the Southern Ocean in the year 1772, which carried around its neck a small parchment with the following inscription "Jacob 1610," giving rise to the logical conclusion that the bird captured had been banded in the year 1610 and was one hundred and sixty-two years old, and that falcons probably live to very ripe old age.

On October 17, 1931 (this year) the writer had the pleasure to witness the capture of a double-crested cormorant on a lake near Ville Platte, La., with the following wording on a copper band around one of its legs: "Notify Biological Survey, Washington, D. C., A 704 999." The identification tag was removed from the bird and on October 20th, three days afterwards, a letter was forwarded to the Biological Survey, at Washington, D. C., as requested on the tag. November 1st, twenty-one days afterwards, the letter was acknowledged in a circular letter received from the Biological Survey, with the following important information included: "A 704 999 was a double-crested cormorant banded at Webster, S. D. by A. R. Lundquist, June 15, 1931." A letter was addressed to Mr. Lundquist immediately, asking for more information concerning the banding of this bird and on November 6th, Mr. Lundquist wrote a very nice letter giving interesting information and kodak pictures showing where the cormorant was banded. His letter is here included as follows:

Webster, S. C., November 6, 1931.

J. D. LaFleur,
Ville Platte, Louisiana.

Dear Sir: Your letter asking information about the double crested cormorant received. I shall try to answer your questions in the following description of our colonies.

I have visited the cormorant nesting grounds near Webster once or more times each year for the past eight years. These colonies are on two islands in South Wanbay Lake which I shall refer to as East and West islands. The West island is approximately five miles northwest of Webster. The East island about eight miles from Webster. The number of cormorant nests on the islands vary each year. The depth of water and other factors play a part. I am inclined to believe that man is the chief worry of nest birds. I know of two colonies of these birds being broken up by men who thought it their duty to rid the universe of what they thought undesirable members. Of course, the birds of this colony had to try to find a new place to nest. I believe this explains the nesting of cormorants at Wanbay Lake as late as September first. The first nests are usually finished and the usual three or four eggs present by the end of the first week of May.

Last June, Mr. William Over, our state Naturalist, and Mr. R. V. Newcomb, instructor of engineering and motion picture camera operator, both from the University of South Dakota, visited our region to take motion pictures of water birds. The party visited the West island and motion pictures were made of the colony and also of banding of these birds. Mr. Over, Mr. Cross (Instructor of Botany at the University) and myself did the banding. We banded in the neighborhood of two hundred-fifty birds that afternoon. Of course as to which one banded the particular bird you recovered I do not know.

The cormorants nest in nests raised slightly off the ground at Wanbay Lake. There are no trees on these small islands for them to nest in. This past year there were slightly more than seven hundred nests on the two islands. I shall send a snapshot or two with this letter so you can see how closely the nests are arranged in the colony.

The East island on Wanbay also has other tenants. The long billed gull, common tern, and other birds are found nesting here. Last summer about two-hundred nests of the common tern were found. Usually the spotted sandpiper and a number of ducks' nests are found as well. I banded a number of the young of the above species as well as a number of black crowned night herons (a colony is found on Rush Lake Island seven miles east of Webster) robins, kingbirds and a few of two or three species of shorebirds.

A splendid thesis by Harrison F. Lewis entitled "The Natural History of the Double-crested Cormorant" may be obtained from the Province of Quebec Society for the Protection of Birds, Ottawa, Canada.

Mr. Lewis states the known colonies of cormorants in Canada are seventy-six with eighteen thousand breeding birds. The number of United States colonies are fourteen with approximately 3000 breeding birds. Thus, you can see that the Wanbay colonies represent slightly more than half of the breeding population of the double-crested cormorant of the United States. (The figures above are only of the double-crested).

Bird banding and bird study is just a hobby to me. I am a member of the Peabody Hospital clinic as a laboratory technician.

I trust you will find the desired material for your study.

Respectfully yours,
ARTHUR LUNDQUIEST.

These two marked incidents happened one hundred and fifty-nine years apart. And in the words of Alexander Sprunt, Jr., a great bird lover. "If the 'Jacob' of 1610 could but see what is going today and what steps are being taken in the advancement of learning through the channel of marking birds, he would doubtless experience the satisfaction of a pioneer. Though probably nothing more than a passing whim on the part of the ancient Jacob, the modern practice of bird-banding is one of the most vital phases of natural history study, in that it is the only means of recording accurately, any definite knowledge of the still somewhat mysterious phenomenon of bird migration."

Banding birds has established certainty for what was only surmised a few years ago. If a bird banded in South Dakota is captured in Louisiana, it remains that that bird can and does fly from South Dakota to Louisiana. And if a number of such birds are banded and taken in varying localities all the way from South Dakota to Louisiana, it proves that this species of birds follows a certain route in its flights in this country. Facts are therefore established making bird-banding very important.

John James Audubon, the great bird lover, was one of the first who attempted to learn something of the movements of birds by marking individuals. He banded a flock of phoebes and obtained results very gratifying. Two of the birds were recovered from points distant from where they had been banded.

Of recent years, the interest taken in bird-banding has been very remarkable. In fact, so much so, that in 1921 the Bureau of Biological Survey of the United States, a division of the United States Department of Agriculture, took over the work. At that time there were about one hundred and thirty-five operators and these had banded around three thousand birds. In five years time, the number of banders increased to eleven hundred with over one hundred and thirty-eight thousand birds banded. In 1930, one thousand seven hundred and fifty operators were enrolled and the number of banded birds was given at seven hundred and forty-two thousand, one hundred and three birds. From barely any returns of the recovery of banded birds in 1921, the number increased in five years to five thousand. nine hundred and twenty-eight and over the period of the first ten years to forty thousand. An article in the American Legion monthly by Sprunt gives the number of bird banders and birds banded on June 1st, of this year, at one thousand eight hundred and sixty-nine operators and nine hundred and eleven thousand, three hundred and eighty-two banded birds, and fifty-one thousand, seven hundred and seventy-five returns.

It may be of interest to state that though there are about two thousand workers in this country banding birds no pay is attached to any for their services. The work is done strictly for the love of birds.

For those who have never seen the kind of bands used it may be stated that they are usually small strips of aluminum or copper alloy, and bear a number together with the words: "Notify Biological Survey, Washington, D. C." In smaller bands the wording being abbreviated as follows: "Biol. Surv. Wash., D. C." Between 450 and 500 species of American birds have been banded, about half this number figure in the recorded returns.

Beside giving definite information about migration, banding also serves as a mean of ascertaining the age of wild birds. According to Sprunt, in the November issue of the American Legion monthly, the oldest banded bird of modern times seems to be a pintail duck banded by Dr. Alexander Wetmore, near Bear River, Utah, on September 16, 1914. This bird was killed near Brawley, California, on October 16, 1926. Since it was an adult female when banded, it must have been at least one year old which would make her age thirteen years. Remarkable indeed for a pintail to have lived thirteen years in this modern age of sharp shooters. (The writer is of the opinion that this bird must have lived in Louisiana in our remarkable game preserves.)

Distances traveled by our wild birds also are definitely established through bird-banding. Sparrows banded in Maine have been captured in Florida. Robins from Minnesota usually spend their winters in Mexico. Doves banded in Ohio have been taken in southern Texas and Mexico. And incident is known of a common tern banded in Maine found dead at the mouth of the Niger River in Africa, probably the record distance established by a banded bird. A cormorant, of the family of birds which prompted the writing of this article, which had been banded by an operator near Lekkerkerk, Holland, a few years ago was shot near St. Paul, Minnesota, some months ago.

(Continued on page 23)

BIRD PROTECTION

By DR. ALDEN W. HADLEY

Assistant to President of the National Audubon Societies.

EDITOR'S NOTE—The Louisiana Department of Conservation was recently honored by a visit from Dr. F. R. Oasler, Vice-President of the National Audubon Societies, and Mr. Alden W. Hadley, Assistant to the President of the said society. Dr. Oasler and Mr. Hadley both spoke at the department's museum at 239 Royal Street, and their lectures were broadcast over the radio. Excerpts from Dr. Hadley's lecture are reproduced below and we believe they will prove of much interest to our readers.

I AM going to talk to you for just a few moments about birds and conservation, or about birds and bird protection.

Something like four years ago the gallant Charles Lindbergh flew across the Atlantic. Ever since that memorable day we have been saying to ourselves that America is becoming air-minded. Day by day it is more evident that America is becoming air-minded, and it is also true that we are becoming bird-minded. By this I mean that thousands and thousands—and even hundreds of thousands—of our citizens here in America are learning to appreciate bird life more than ever before and, in fact, to appreciate everything in God's great out-of-doors.

Dr. Chapman says that every one is born with a bird in his heart. I am sure that he is right. We are born with a bird in our heart, but the trouble is we become so burdened with the cares of life that the bird in us dies.

There are several reasons why I am interested in birds. First, as a scientist; second, from the point of their usefulness and economic value; and third, because of their beauty.

Professor Beale made the statement that each day some 800,000 tons of seeds are consumed by birds. Also an approximate amount of harmful insects. Our farmers could not raise their crops without birds.

In the event that all of the bird life were destroyed from the face of the earth, then life would indeed become unbearable. Birds represent the most consumate flowering of the feathered life on the earth. What would springtime in America be, or in most parts of the United States, without blue birds. What would springtime be in England without the robins.

Mr. McQuin, in addressing the chair during his fight for the passage of the migratory bird law, said, "Mr. President, I will do all I can to save the birds from guns, for if some spring the birds should fail to come back to my door yard, you could have the door yard and the spring, for neither would be of any good without the birds." Yet forty-five or fifty years ago laws had not been enacted to protect birds; forty-five or fifty years ago if you had walked along the streets of New York, you would have seen the plumage of the birds on the hats of the women. I sometimes think that man is the most destructive of all creatures, and yet we were given the order to replenish the earth. One of America's greatest scientists has made the statement that, in his opinion, we may be called upon in our day to witness the passing of the age of mammals.

However, we can save and protect the wild life. This can be done in several ways,—through legislation, through the creation and direction of refuges, and through education. Despite the fact that some few years ago America had no bird protection laws, she has today laws that give protection to all national game birds in the State of Louisiana, as well as other states, that are not covered by the Treaty with Canada; today she has more than seventy bird refuges which are under the protection of the United States Bureau of Biological Survey; and today she has lecturers throughout the country who work unceasingly to bring to our entire population the necessity for bird protection.

In the year 1910 the National Association of Audubon Societies conferred with Mrs. Russell Sage in order that a campaign might be begun in the schools of the land with a view of interesting the children in wild bird life. That movement, started in 1910, has progressed rapidly and today the National Audubon Society has enrolled, in the United States and Canada, thousands of junior members of the Audubon club. As a means of carrying on this educational work, the National Audubon Society has co-operated with both the educational departments of the various states and the Departments of Conservation. We have co-operated with the Department of Conservation of the State of Indiana for some five or six years, and the Game Commissioner of the State of Maryland has asked us to appoint a man to lecture throughout the school year on birds and conservation.

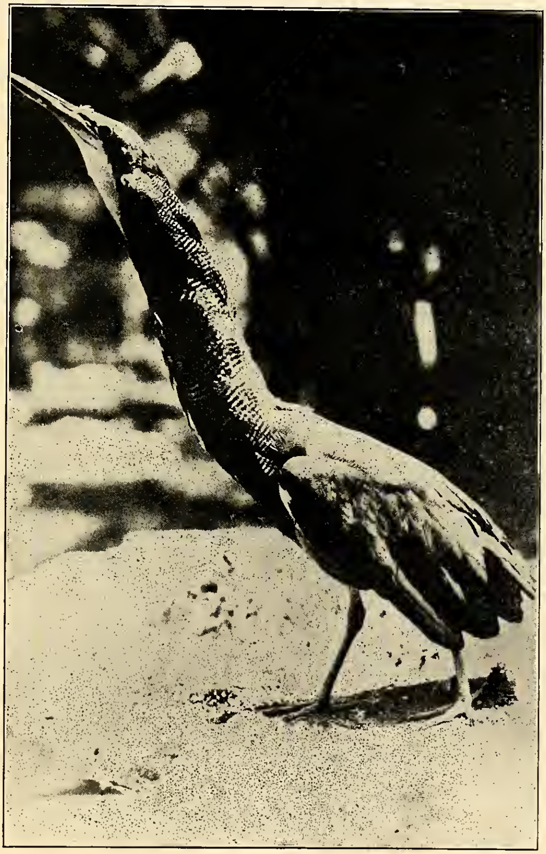
Last year we employed thirty-four special wardens to guard sea birds, thirteen of whom were made either Federal or state deputies. We protect over seven different colonies of water

(Continued on page 14)

A Day Studying the Gray Heron With a Camera

BY E. R. GAMMAGE

ONE shrill scream of terror and pain, and all is quiet again among the shadows on the water's edge, or one swift writhing of anguish and all is motionless — the heron is out after prey. As with most other birds and animals, there is no fight, or struggle, no tumult nor fuss, for the heron stands, one foot in the water's edge, as motionless as though carved from stone, its sombre plumage, and absolute stillness rendering it almost inconspicuous among shadows in spite of its large size. In position it waits and, when some unfortunate but appetizing object comes within striking distance, the long neck, which has been retracted with head resting between shoulders, darts out with lightning - like swiftness, and the long, sharp beak pierces through the eye of the victim with a death - dealing thrust. This peculiarity of always aiming for the eye is very effective and seldom fails in hitting the mark, and in instantly killing the prey or adversary in battle. In fact, so strong and dagger-like are the heron's beak that some savage tribes mount them upon sticks and use them as spears. At times, the heron diversifies its methods by running through the water, stirring up its prey and striking at it before it has time to escape.



There are one hundred known species of the heron, fourteen of which are in the list of birds of East North America, ten of these falling in the category of permanent and summer residents in Louisiana.

The herons are gregarious, breeding in extensive colonies, the nest being placed in the tops of trees, or on high rocks along the coasts. The nests are made of sticks and lined with twigs and present a somewhat bulky appearance. The nesting places are called "rookeries." In the early days in England the rookeries were protected by law, and it was illegal to shoot a gun within 600 paces of one of them, the favorite way of taking the heron being hawking.

From four to six sea-green eggs are usually laid. The young are covered with thin hair-like down. The little birds are quite helpless for a time.

The food of the heron consists of small fish, frogs, crawfish, snakes, birds, and lizards. It consumes great quantities of food and being possessed with the ability to disgorge what it has consumed at will, it can easily feed its young with partially digested food; the young birds seizing the bill of the mother bird as she transfers the food to them. The heron can resort to the disgorge measure when being chased by

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Preventing Pollution of Rivers

New York City's Efforts to Solve Problem

By JOSEPH P. DAY
Chairman, Tri-State Pollution Commission, States of New York, New Jersey and Connecticut

As Chairman of the Tri-State Anti-Pollution Commission, representing the three States of New York, New Jersey, and Connecticut, I have been asked repeatedly: Why was this Commission created and what does it hope to accomplish?

In answer to the first question, I have pointed to a suddenly awakened public consciousness of the danger that lurks in polluted waterways.

Specifically, the dangerous condition which this Commission was called into existence to correct, lies in and around the City of New York. Actually, similar conditions are to be found in the vicinity of most of the great cities of the country.

For hundreds of years the mighty rivers which make of Manhattan an island, have been the boast and pride of New Yorkers. Truthfully, the amazing growth of New York City has been due in no small measure to these rivers which have formed what is perhaps one of the greatest, if not the greatest natural seaport in the world.

And then, suddenly the public awoke to the fact that the very waters that had been responsible for the growth of New York, menaced its future well being, prosperity and even existence.

One investigation after another was set under way. By authority of the New York State Legislature, the Metropolitan Sewerage Commission was created. That body labored for eight years and brought forth a masterly report, all bound up in three handsome volumes. And there it stayed.

New York is in grave danger, said this report, of an epidemic which may sweep down on it at any moment. And nothing happened.

A little more than a year ago a metropolitan newspaper began a campaign of education to awaken the public to the truth of the situation confronting it.

The newspaper conducted an extensive and intensive study of the whole question; engaged expert and scientific advisors and finally concluded that the problem of cleaning up the waters around New York could never be accomplished save by the concerted effort of the authorities, not only of New York City itself but of the State as well. And in addition they called on the States of New Jersey and Connecticut to join hands in the movement. The reason for this was readily apparent, once a comprehensive understanding of the problem was to be had.

Polluted matter to the extent of hundreds of millions—actually billions of gallons daily reached the waters around New York from the upper reaches of the Hudson River; from the rivers and harbors of New Jersey and even from Long Island Sound into which Connecticut's polluted rivers had been emptying for hundreds of years.

So, it was, that the first objective set up in this campaign to end pollution and clean up the waters around New York was the creation of a Commission—now, the Commission which I have the honor to head. Which leads to the second question most frequently asked, namely, what does the Commission hope to accomplish?

This Commission was created by legislative enactment in the Legislatures of the three States, now a party to its deliberations. Each State expressly directed their respective commissions to confer with similar bodies from the other two States for the purpose of forming a treaty which must first, have the approval of the Federal Government, and secondly, meet with the approval of the three State Legislatures at their next session.

And by this treaty a plan or program for preventing further polluted matter reaching the natural waterways, as well as a definite proposal for eliminating that which is already there, is to be offered.

The Commission starts with the admitted fact that the waters around New York are dangerously polluted. It has no authority or intention of attempting any further survey of the existing situation. That has been done over and over again.

What this Tri-State Anti-Pollution Commission is now attempting to do is to set down in simplest terms, a definite proposal that will be mutually agreeable, where three soverign States will work hand in hand to end a condition that threatens public health and presents a serious economic loss from the destruction of the shellfish industry, the closing of bathing beaches and the deteriorating effects on physical waterfront properties from noxious fumes and gases thrown off by the polluted waters.

The Tri-States Commission is essentially a laymen's Commission, appointed to make practical use of scientific achievements. The engineers,

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Standard Sought for Commercial Mineral Waters

State Health Officers Also Adopt Resolution Favoring Plan to Control Distribution of Shellfish.

RESOLUTIONS providing for the formulation of a plan for safeguarding the production and distribution of shellfish, and to work out a tentative standard for potentially dangerous mineral waters sold from various commercialized springs and wells in the country, were adopted April 30, at the closing session of the conference of State and Territorial Health Officers, in Washington.

The resolution to safeguard present measures regardnig the distribution of shellfish requests that the Public Health Service develop a definite scheme, or table, for rating the control over the production and the handling of shellfish. This table, or plan, then is to be submitted to the producing States for their approval.

The second resolution provides that the Surgeon General shall be notified of the advisability of working out a method to set up standards of what shall constitute potentially dangerous mineral water, these standards to be based upon suggestions submitted to him.

Sanitary Engineer R. E. Tarbott, of the Public Health Service, read a paper on "A Proposed Method of Reporting Efficiency of State Control Over Shellfish Sanitation," and the resolution calling for the working out of such a plan was adopted after Mr. Talbot's proposals had been discussed by other delegates.

State health departments should work with the Federal Food and Drug Administration in enforcing regulations regarding mineral waters bottled and shipped at approximately 400 wells and springs in the United States, W. S. Frisbie, chemist in charge of the Office of Cooperation, Food, Drug and Insecticide Administration of the Department of Agriculture, told the conference.

Before making available to delegates his paper entitled "The Coordination of the Sanitary Control of Bottled Mineral Waters," Mr. Frisbie outlined work of the Administration in prohibiting the adulteration or the misbranding of bottled mineral waters. Samples of such water first are obtained at their source. Afterwards, Mr. Frisbie explained, the Administration constantly is collecting samples in the open market. However, inasmuch as the Administration has no sanitary engineers, the cooperation of State Health Departments, which do have sanitary engineers, is necessary in the work of controlling mineral waters, according to Mr. Frisbie.

Dr. Estella Ford Warner, a special consultant, lent temporarily to the Public Health Service for work in drought areas on a child hygiene program, outlined to the conference her program. She will visit various areas to ascertain how the Public Health Service may be of greater aid in local work and to help in working out better methods in accomplishing this work, she said.

"Our Responsibility in the Drought Area Under the New Federal Appropriation" was the subject of a paper read to the delegates by Dr. F. J. Underwood, Executive Officer of the Mississippi State Board of Health. He stressed the necessity of an immunization program in that State because of the weakened resistance to disease of many people. About 40,000 persons, he said, had been vaccinated against smallpox. He pointed to an increase in the tuberculosis and pellagra in Mississippi.

Local public health agencies, he stated are being set up in those counties where it is believed the agencies will be permanent.

The delegates also were told that about 3,000 people in Oklahoma are suffering from pellagra and that the number is increasing.

From the viewpoint of public health work, too much emphasis cannot be placed upon the importance of preserving agriculture as an industry in this country by maintaining sanitary and healthful conditions in rural areas, Dr. A. T. McCormack, State Health Director of Kentucky, told the conference.

Farmers must be made to stay at home "because they love it" and because they own their farms, inasmuch as these farmers are a "reservoir" to preserve the liberty and the institutions of the United States, Dr. McCormack said.

Health workers in drought areas, according to Dr. McCormack, have had imposed upon them by Congress, through the recent $2,000,000 drought health relief appropriation, a "great responsibility." While pointing out that this responsibility rested on local public health units, and not on the Federal Public Health Service, he declared that future programs of public health would be weakened in the same proportion as local agencies failed to meet their responsibilities.

Nature Reclaims Artificial Lakes

Conditions in Palisades Park are Described

By MAJOR W. A. WELCH
General Manager, Palisades Park, States of New York and New Jersey

One of the most interesting features of the return to original natural conditions, in the Harriman State Park, the Hudson Highlands division of the Palisades Interstate Park of New York and New Jersey, is the gradual softening of the outlines of the dozen artificial lakes dammed in the Harriman section during the past fifteen years, by the reestablishment and extension of water-loving plants along their shores. These plants are fast giving the lake shores a finished, natural appearance, which was lacking when they were first dammed and flooded.

Few visitors to the Harriman Park realize that the lakes which they see along the Seven Lakes Drive, the main motor artery from Bear Mountain to Tuxedo and on other park highways, are artificial. The dams are mostly concealed from sight in some hidden cove or around a point out of view, and most tourists think the lakes were always there, and are surprised to learn that most of them have been dammed within the past 20 years since the park was established in 1910. Then, too, many of them occupy the sites of old glacial lakes, scooped out by the continental ice sheets of the last Glacial Epoch, or dammed in that period by local moraines, and afterwards drained by the lowering of their outlets by erosion of the streams that empty them.

The ancient glacial dams were in most cases adopted as the lines of the modern concrete structures, and therefore these artificial lakes come back by right to the high valleys and hollows where the melting ice of the great ice sheet filled them 20,000 or 30,000 years ago. Forests had grown into these drained depressions and although sometimes cleared by man, a century or so ago, had come back again by the time the program of lake development for the purpose of increasing water recreation was begun.

When this forest was cut off, up to the line of the intended high flow of the new lakes, and the water was allowed to rise behind the dams, the shores, for a time were raw and unnatural, with the woodland just above the shore of an even line, and little plant life in the water. Aquatic vegetation which may have existed in the swamps or smaller ponds that were submerged by the damming was, for a time, nearly exterminated, as the water rose too fast for these plants to adjust themselves.

The smaller of the two Cedar Ponds, where Lake Tiorati now stands, was covered with white water lilies, but when the water rose 20 feet in a few months behind the dam, the lillies could not adjust themselves, and most of them failed to survive. Many species of bog and shore plants did survive, however, in the curious floating island, which was formerly a part of the quaking bog around Little Cedar Pond. When the water rose, the bog tore loose from its former position and floated around the lake, until it finally came to a halt near the southwest end of the present lake.

The old bog plants, the insectivorous sundews and pitcher plants; the marsh fern, water loosestrife, cranberries, swamp honeysuckle, poison sumach, red maple, a few small tamaracks, a terrestrial bright yellow flowered species of bladderwort, water arums and cat tails, persisted and now afford a very interesting association on the floating island.

The wooded banks, at the high level, were lacking in shore and shallow water aquatics for a year or two after the flooding, and the lake border had an appearance quite different from that of an old pond. But little by little the water plants came back. Birds and animals and the wind brought their seeds, and once established in the shallow coves and numerous little nooks on the curving shores and points and islands in Tiorati, they slowly spread.

First the sedges and rushes, which grow along the brooks and swamps emptying into the lake, established their dense colonies in the shallow water just off the shore. Water arums, probably seeded from floating fruits blown off the floating island, took hold in quiet places. After a little silt had gathered on the rocky bottom, bur-reed and pickerel weed followed, and were followed by the arrowhead. As the mucky soil on the lake edge became denser, the cat tail reappeared, its seeds blown from somewhere in adjacent swamps. The yellow water lily, first, and later, the white water lily, reappeared, either from root sticks that survived the rising of the water or from some reintroduction by animals, and are now increasing yearly, although the latter has to be watched against the thoughtless depredations of Summer visitors. The water plan-

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REDUCING ECONOMIC LOSSES CAUSED BY WILD ANIMALS

National Program of Federal Department of Agriculture Based on Cooperation With State and Local Agencies

By STANLEY P. YOUNG

Chief, Division of Predatory Animal and Rodent Control, Bureau of Biological Survey, Federal Department of Agriculture

FOR more than fifteen years the Department of Agriculture, through the Bureau of Biological Survey, has been working on the control of two groups of destructive wild animals of the United States and its territories.

The first group consists of the predatory animals—such as wolves, coyotes, mountain lions, and bobcats—that every year destroy large numbers of livestock and game. The coyote also serves as a carrier of that dread disease rabies, or hydrophobia.

The second group consists of economically injurious rodents such as prarie dogs, ground squirrels, pocket gophers, rabbits, field mice, porcupines, and rats. These smaller pests not only destroy growing and stored crops, forest and other nursery stock, and the range grasses that support the farming and livestock industries, but in some cases also spread such diseases of man as spotted fever (by ground squirrels), tularemia (by rabbits), and bubonic plague (by rats and ground squirrels). Control of these economic wasters is necessary in the interests of agriculture, horticulture, forestry, animal husbandry, and wild game.

The settler who saw the profits of his hard work wiped out by the incursions of wolves, coyotes, mountain lions, and bobcats into his stock ranges, and of prairie dogs, ground squirrels, pocket gophers, jack rabbits, and other rodents, into his cultivated fields, had no other recourse than to ask the aid of the Government, whose lands served as breeding reservoirs from which these destroyers kept coming. Uncontrolled, they they would reinfest his stocked and cultivated acres in spite of all that he could do to prevent them, either single-handed or with the aid of his neighbors. To effect some measure of relief, he and his neighbors resorted to the use of such instruments as the steel trap, the rifle, poisons, and trained dogs. The appeals they later made upon the Federal Government for aid in supressing predators and rodents on the public domain led to the first cooperative Federal efforts towards control.

Prior to the Federal Government's entry into the cooperative control program the desultory warfare against these animals had included the payment of bounties, a premium on the heads of the predators, to stimulate individual activity in their control. Bounty laws have continued in effect more or less to the present, though within the past 15 or 20 years many of them have been repealed, because it was found that they encouraged only sporadic efforts toward control and were productive of frauds. Since that time the steady growth of correlation of Federal, State, and local efforts has resulted in better and more efficient control measures.

The leadership of the Biological Survey in predator and rodent control since 1915, has been requested and encouraged by States, and other cooperating agencies, and the funds made available from such sources for expenditure under the direction of this Federal agency have been far in excess of those provided for the purpose from the National Treasury.

Research studies of the geographic distribution and relationship of the wild birds and mammals of the country and studies in the field of their food and other habits have been carried on by the Biological Survey for almost half a century, and these investigations have provided the basis of the control work carried on. Scientifically trained men are continuing research along these lines, both in the field and in the laboratory. This will be expanded as funds permit.

The legal sanction for control work by the Federal Government is contained in congressional direction in annual appropriation acts for the Department of Agriculture. These provide for investigations, experiments, demonstrations, and cooperation for the control of wild animals that become economically injurious, and for the suppression of rabies in predatory animals.

A special program of control, which was called for by the Seventieth Congress, was drawn up by the Department of Agriculture to cover a 10-year period. Its authorization by the Seventy-first Congress shortly before adjournment, and its approval by the President on March 2, of this year, will make more effective the work as already organized, rather than stimulate new lines of control. The passage of the law, after careful consideration and public hearings, should set at rest any reasonable doubt as to whether the control program as at present organized deserves public approval.

The 10-year program contemplates continued cooperation between Federal, State, and local agencies with a view of avoiding duplication of work and insuring the largest possible return from the efforts and funds expended. The Biological Survey will continue cooperation with the Office of Cooperative Extension Work, the extension service organizations, including colleges and county agricultural agents, and with the State departments of agriculture, county commissioners, game commissions, and various agricultural, horticultural, and livestock organizations. In the work on Federal lands the 10-year program contemplates close cooperation with the Forest Service, the Indian Service, and with other agencies as necessity arises.

There are at present more than 16,000,000 acres of rodent-infested lands within the national forests. The greater portion of infested lands is thickly populated with prairie dogs and ground squirrels. Experiments and observations over a long period have demonstrated that prairie dogs will destroy from 20 to 80 per cent of the succulent forage grasses about their towns. The 10-year program plans in cooperation with the Forest Service, a thorough control of rodents where it has been determined that they lessen production on grazing areas.

In many of the Eastern States also there will be increased effort for the control of rodents. The additional funds to be provided under the program will permit Biological Survey leadership in organized work for the control of such rodents as cotton rats in the South, of pine mice and pocket gophers, and of the common brown rat, which is probably the most destructive of all animals.

In the national forests and on other public domain on many areas of which control operations have never been undertaken are breeding grounds of such predatory animals as the coyote. The 10-year program contemplates such control of predators within forest regions to an extent that will reduce to the minimum the infestation on adjacent livestock-grazing areas. Under present conditions such control is not possible, because of their reinvasions each year from a constantly renewing source of supply.

While much has been accomplished during the past 15 years, the degree of control of the predatory animals and rodents that is desired has not been attained. Reinfestation of cleared areas is, therefore, constantly occurring. Since the inception of the work the Biological Survey has been following a well-defined plan, but it has not yet been able to reach its goals. The authorization of the 10-year program will be an aid in more adequately controlling injurious animals.

It cannot be too strongly emphasized that the established policy of the Biological Survey with regard to injurious species of wild animals has been, and will continue to be one of control rather than of complete eradication. The Survey is not embarked upon a general extermination program, but has every proper consideration for wild-life conservation interests. Only by control measures properly directed can the burdensome losses suffered by farmers and stock raisers be reduced to the minimum and beneficial forms of wild life protected from undue destruction by their natural enemies. Though this policy in some cases may mean local extirpation of harmful forms, it will not result in the complete eradication of any species that adds interest to the wild when far removed from industrial operations.

BIRD PROTECTION

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birds, and I might add here that in the State of Louisiana we are proud of our wild life refuges in Vernon Parish, and we are proud of the work that the State of Louisiana is doing in this direction. The future of our wild life is going to be saved by the creation of additional sanctuaries, and no doubt most of these sanctuaries will have to be created in Louisiana, as this state has the most wonderful winter grounds for wild water fowl.

The problem of bird protection is essentially a national one. It is the duty of both Canada and the United States to protect migratory wild bird life. Five or six years ago Dr. T. Gilbert Pearson succeeded in organizing the National Committee for Bird Preservation. Today this committee has representatives from twenty-four nations, including Japan, and is presided over by Dr. Pearson. The people of Southern Europe come to this country and bring with them the destructive ideas they have acquired in their homes. It is evident, therefore, that all nations must be educated to the value of our bird life.

And now in conclusion, may I leave this thought with you? As I have looked into the faces of hundreds of thousands of school children, I have felt that a great hope for the future of bird protection and the solving of the problems arising therefrom will be begun in the school rooms of the nation, although the final solution is found in our legislative halls.

What Shall We Do With the Lands?

BY W. L. BROWN

[EDITOR'S NOTE—This article is contributed by W. L. Brown, of Mandeville, St. Tammany Parish, Louisiana, who wrote "The Great Outdoors of the Southland," published in the September issue of the Review, and which should be read in connection with this one. In response to numerous inquiries it has been printed in booklet form which may be had upon request to W. L. Brown, Mandeville, Louisiana.]

THE power of land to produce is said to be the basis of all wealth. Any effort to determine the productive power of land must of necessity reckon from the standpoint of competition, and take full cognisance of the law of supply and demand. If to produce something for which there is no demand by reason of a competitive thing being supplied at a lesser price—as for instance, to grow wood for fuel when natural gas can be supplied for less than the cost of chopping and hauling—then we would say its power to produce is lacking. By the same token, if certain lands produce agricultural products at a profit, it would be quite inconsistent to say that certain other lands on which this could not be accomplished, would have power to produce in this particular respect, even though agricultural products could be grown in profusion—but at a loss on account of production or investment costs. So to find the basis of wealth—the power of land to produce, we must seek to know its adaptibility—the thing for which it can be profitably used. Our thoughts turn to agriculture when we say land. But over-production looms up everywhere—more grain, more cotton, more sugar, more fruits and vegetables than can be used at a profit to the producer. Thousands upon thousands of acres of productive lands are idle—nothing to do but plant, cultivate, harvest and sell—but at a loss. So these wonderful farms and plantations are unused—some of them are being sold for mortgages or taxes because they have no power to produce agricultural products at a profit. If it be true that rich alluvial lands all cleared and ready for the plow, have no power to produce, what about our vast areas of cut over lands? Sun-baked and fireswept, until the only evidence that they ever had any power to produce, is the charred stumps standing like black ghosts, to ward off any attempt to coax further production—surely these lands are not adapted to agricultural use, even though donated, the cost of puting in order to plant and cultivate would greatly exceed the price for which abandoned farms can be bought.

If lands have no power to produce from the standpoint of agriculture—then what shall we do with the lands? Reforestation suggests an answer because we have only to observe the signs of the times to realize that our timber supply is being rapidly depleted without adequate provision for the future. But can the landowner carry his holdings for forty or even twenty years, awaiting timber or paper-pulp wood returns? Perhaps he could if it were only to wait, for many of our lands reforest rapidly and with but little effort or expense except to prevent fires. But what about taxes—can public progress—roads, schools, and other community developments be handicapped for lack of funds for twenty or forty years while a tree crop is growing? The lands must produce taxes—State and Parish or County revenues must be maintained and industries cannot bear the whole burden—else industries will go where the load is lighter. Conservation of our remaining woodlands and an earnest effort to aid the reforestation of barren areas by fire prevention and replanting, is surely essential to the solution of our land problems. No greater menace to the power of land to produce, exists, than the devastating effect of fire in its multi-ramifications. But what shall we do with the lands to give them power to produce—even the taxes necessary to maintain public revenues? Our query applies primarily to southern lands and particularly to those lands from which the merchantable timber has been removed and of which hundred thousands of acres are being turned back to State for taxes—its quota of public revenue to be borne by other lands or industries. A logical answer will also reflect the solution for much of the idle or abandoned farm lands of which it has been said by one whose wide experience suggests authenticity: "I saw thousands of acres of what you people call abandoned farms. I saw city workers coming out buying them, meaning some day to fix up the old house and retire to it. I saw others trying chicken farming, bee keeping and dairying. And it was a very pathetic sight because with all their energies they were theorists still, and getting nowhere. I looked at all those hills, with their fine covers, their woodlands and streams, the beauty of it all —the comfort and ease. Oh how I'd like to see them stocked with grouse. pheasants, woodcock and quail, and with ground game—hares and rabbits. There's money in it, man, money. And it would be heaven for the hunter and a new source of income for the state. Why, in England, grouse shooting is the 'Grand Opera' of field sports. The season is four months, and crowds invade the moors. It was reported that grouse shooting payed the dividends of one of the railroads there—in train fares to the moors. And there are only about 30,000 square miles of this God forsaken country, while we have here over 2,000,000 square miles where grouse may be seen in sadly diminishing numbers. And wild turkeys too—why with proper care wild turkey breeding would be a solution to many a farmer's dilemma. It is a sad thing to see such possibilities going to waste. Why, within a few years you'd have the grandest country in the world for field sports."

Relatively recent developments have resulted in the formation of a Foundation with offices in New York City, under the corporate name of "More Game Birds In America." Its single purpose is to accomplish just what its name implies—to increase the number of game birds in America. Even though the effort is only fairly started, already more than a million dollars have been provided to carry on this laudable undertaking. That its purposes and plans have a mighty significant meaning is evidenced by the support it has from men prominent in national affairs. Its founders believe that by increasing the game birds in America, a new and great industry, supporting thousands, can be established—an industry which may be made to utilize much land which is now wholly waste or of very little value. In referring to the effort, President Hoover said, "It is all so much in accord with my own view of helpfulness, that I would be glad to be of assistance to the movement in any way I can." One has only to note the result of our past effort to conserve and increase wild life in the United States to realize that some changes in our game laws are necessary, for game continues to vanish in spite of the laws made for its preservation. While game birds have been decreasing in the United States, they have shown a steady increase in European countries. In Great Britain, quail have increased over two hundred percent and pheasants more than a thousand percent, even though they are being killed in tremendous quantities during long open seasons. Private enterprise must be depended upon to protect and propagate wild life. The way to make game more abundant is to commercialize it. The British system of game preservation was subjected to a very severe test during the World War, and notwithstanding war activities greatly reduced the number of game keepers, and the number of stock birds to ten percent of the annual carryover for breeding purposes, within six years they were back to normal—an increase of 900 percent in six short years. And fish—why the United States Department of Commerce in a recent issue of "Domestic Commerce," reports that the "Miniature" Trout Fishing enterprise bids fair to become as popular as the miniature golf craze which swept the country last year. It appears that in locations where water and other conditions are suitable, pools and raceways are installed and stocked with legal size trout. A charge is made for the privilege of fishing in these private pools. Apparently such an enterprise appeals to the public as a means of securing a delicacy for food as well as obtaining the recreation and thrill of acquiescence to the call to "go a-fishing." And here is a significant comment, "It is further pointed out, however, that although many states are noting the rise of this recreational industry, special conditions are necessary for the successful development of such an enterprise, and that in comparatively few places would the perfect combination of suitable land, water, and scenic conditions be found." The public wants recreation—the lure of the great outdoors is constantly growing and will continue to increase as facilities are made available. The development of highways and byways into the remotest recesses of the Southland is intesifying the urge to "go places and do things." The ever-increasing receipts of Departments of Conservation for hunting and fishing licenses is indisputable evidence that people want to play—that the desire for recreation is steadily impelling obedience to this universal human instinct. And this, in spite of the fact that game is steadily decreasing, even to the point of extinction of certain hunted species. Notwithstanding smaller bags and more closed seasons the demand for licenses has increased at the rate of 250,000 per year. More than 7,000,000 hunting and fishing licenses were granted in the United States last year for sums varying from $1.00 to $100.00 each. One state alone received $7,600,000.00 for hunting and fishing licenses in one year. Another state, where ice and snow prevail six months in the year, and game has to be fed and cared for, boasts of an annual tourists harvest of $200,000,000.00, lured by field sports. The Conservation Commission's report from another of these northern states where tourists spend $250,000,000.00 annually, calls attention to the enormous profit accruing from the conservation and scientific propagation of its wild life,

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Review of the Fish Farming Industry of United States

BY CLARENCE R. LUCAS
Temporary Assistant, U. S. Bureau of Fisheries

DURING the past century the increased interest in depletion of fisheries in the United States has been attended by a corresponding increase of interest in fish farming. The demand for game fishes has caused State and Federal Governments, as well as sportsmen's organizations and individuals, to apply concerted efforts to rehabilitate our waters. This growth has been attended by increasing knowledge that has revealed the opportunities in raising fish for market.

The commercial fish-farming activities in the United States may be divided into three divisions: The trout industry, the pond-fish industry, and the goldfish industry. Believing that these industries were adding materially to the economic welfare of the United States, surveys were made of them by the Bureau of Fisheries in order to ascertain their importance. The report on the goldfish industry by Quast (1929) has already been published. The information in the report on the trout and pond fish industries is based on the findings of the writer as obtained in a personal canvass which was conducted during the months from September to December, 1930, and which covered representative establishments in all sections of the United States. In addition, questionnaires were sent to all establishments engaged in the trout and pond fish industries, whose names were on record with the bureau, to obtain figures on the scope of their operations.

The writer wishes to express his appreciation for the cooperation received from members of the trout and pond fish industries in supplying information and answering the questionnaires.

TROUT AND POND FISH INDUSTRIES

The trout industry includes the farming of charrs and trouts. It had its inception in 1864, when Seth Green started a hatchery at Caledonia Springs, N. Y. (Milner. 1874). Artificial impregnation and hatching of trout had been accomplished, however, as early as 1804, when this was done successfully by the Rev. John Bachman of Charleston, S. C. (Slack, 1872). The pond-fish industry includes the farming of basses, sunfish, crappie, and catfish. The writer has been unable to determine from any records the year of inception of this industry, but from personal interviews with the culturists in the industry, it was probably during the year 1900 that the first pond-fish establishment was founded.

The early development of the trout industry was confined to the eastern part of the United States, where scarcity of fish for sport fishing was first noticed, and which forced the States to make regulations prohibiting the sale of wild game fish.

Species Cultivated—Trouts produced: Brook trout or "speckled trout," Salvelinus fontinalis; rainbow trout, Salmo idrieus; cutthroat trout, Salmo lewisi; brown trout, Salmo fario; Loch Leven trout, Salmo levenensis; lake trout, Cristivomer namaycush; and landlocked salmon, Salmo salar sebago. Pond fish produced: Largemouth black bass, Micropterus salmoides; smallmouth black bass, Micropterus dolomieu; crappie, Pomoxis annularis and P. sparoides; Bluegill sunfish, Lepomis incisor; and catfish or bullhead, Ameiurus nebulosus.

All of these trouts and pond fishes, except the brown and the Loch Leven trouts, are native to waters in the United States. Loch Leven trout eggs were first received in this country in 1884, at which time brown trout, which were introduced from Germany, were already established in eastern American waters.

Each of these species of trouts and pond fishes were confined in range by natural barriers, such as mountains and deserts, and by the limited existence of favorable waters. Through extensive shipments of live eggs and fish, however, the ranges of these species have been greatly increased, and each may now be found in most of the suitable waters in the United States.

Geographical Extent — Geographically, the trout industry is confined to localities where cold-water supplies are available. Pond fish require warmer water than do trout. Thus, while trout raising is confined mainly to the northern half of the United States, commercial pond-fish raising extends as far south as Oklahoma, and southern California. In addition to natural restrictions, legal restrictions are quite numerous, and the recommendation is made to anyone contemplating going into either the trout or the pond fish industry that information concerning such regulations be solicited from State officials.

In showing figures on production and distribution, the United States has been divided into three sections, which are called the Eastern Section, the Central Section, and the Western Section. The Eastern Section includes the States of

Maine, Massachussetts, New York, Rhode Island, Connecticut, and Pennsylvania. The Central Section includes Wisconsin, Michigan, Minnesota, North Dakota, Nebraska, Missouri, and Oklahoma. The Western Section includes Colorado, Wyoming, Utah, Montana, Idaho, Washington, Oregon, and California. From the standpoint of production and distribution, Massachusetts, Pennsylvania, and New York are the States most important in the Eastern Section, while Colorado is the only outstanding State in the rest of the country.

In 1929, there were 133 establishments engaged in the trout industry. These employed 253 persons, exclusive of proprietors, who were paid $271,088 in salaries and wages, and used 5,969 acres of ponds in their operations. The pond-fish industry engaged nine persons, exclusive of proprietors, who were paid $6,450 in salaries and wages for 11 establishments, which used 638 acres of ponds in production.

Approximately half of the total acreage of water used for trout was in Colorado, where, in certain localities, natural lakes are utilized. In these lakes the trout fry are planted in the spring, and from then on the culturist exercises no control over the trout, except in feeding artificial foods. Fish for food are caught in gill nets or by hook and line, and eggs are taken when the adult fish "run" in the creeks tributary to these lakes.

In other parts of Colorado, and in most of the rest of the United States, where fish culture is practiced, trout are retained in enclosures where they are fed, graded as to size, treated for disease, and kept under direct observation at all times.

Production—During 1929, trout farmers of the United States produced 231,141,721 eggs, of which 171,093,444 were spawned from brook trout. The remainder were from rainbow, cutthroat, and brown trout. A large part of these eggs were sold to sportsmen and to State and Federal Governments. No pond-fish eggs are shown in the tables since they are allowed to hatch naturally, and thus operations are largely uncontrolled by the fish-culturist. The production of fry numbered 32,258,742, consisting mainly of brook and rainbow trout. The production of largemouth black bass fry amounted to 429,400. Large numbers of fry were sold to sportsmen and to State and Federal Governments.

In 1929, 9,475,467 adults were produced, and the greater part of this number consisted of brook and rainbow trout.

Brook trout is the most important species cultivated in the Eastern Section, while rainbow trout have proven most popular in the Central and Western Sections. Brown trout are cultivated to a small degree in all three sections, as are black bass. Production of cutthroat trout is important only in the Western Section.

Large differences may be noted in the numbers of eggs, fry, and adults produced in 1929. This is due to the fact that all of the products are not from the same year's activities. Most of the eggs taken in 1929 were spawned from October through December of that year. The fry and fingerlings produced in 1929 were hatched largely from eggs taken in the later part of 1928, and the yearlings and adults produced in 1929 had developed largely from the fry, fingerlings, and yearlings of 1928. Thus, no direct correlation can be shown between the number of eggs, fry, and adults produced in any one year, and the figures collected in the survey can not be tabulated so as to show losses incurred in hatchery operation.

Distribution—Products marketed by the trout industry in the United States in 1929 had a combined value of $1,072,700. These products were composed of eggs valued at $214,197, fry and fingerlings at $62,243, yearlings and adults for stocking at $202,446, and adults for food at $588,814. Pond-fish products marketed were valued at $21,444, and were composed of fry fingerlings

TABLE 1.

Production of the Trout and Pond Fish Industries in the United States, 1929.

	Fry			Fry and Fingerlings		
	Eastern Section Number	Central Section Number	Western Section Number	Eastern Section Number	Central Section Number	Western Section Number
Brook trout	137,856,444	6,147,000	27,090,000	8,458,000	657,300	8,529,450
Rainbow trout	6,095,300	5,875,000	38,331,000	522,925	1,131,000	9,548,000
Brown trout	850,500	2,381,000	50,000	407,317	140,000	20,000
Cutthroat trout	......	170,000	6,195,477	......	25,000	1,313,500
*Miscellaneous trout	100,000	......	......	226,500	25,000	101,000
Largemouth black bass	......	......	......	.....	169,400	260,000
†Miscellaneous pond fish				63,150	13,200	648,000
Totals	144,902,244	14,573,000	71,666,477	9,677,892	2,160,000	20,419,905

TABLE 1—Continued.

Production of the Trout and Pond Fish Industries in the United States, 1929.

	Yearlings and Adults			Total		
	Eastern Section Number	Central Section Number	Western Section Number	Eggs Number	Fry and Fingerlings Number	Yearlings and Adults Number
Brook trout	1,944,013	230,921	2,390,207	171,093,444	17,644,750	4,565,141
Rainbow trout	69,734	373,450	3,130,575	50,301,300	11,201,925	3,573,759
Brown trout	95,231	57,000	1,000	3,281,500	567,317	153,231
Cutthroat trout	.....	1,000	301,350	6,365,477	1,338,500	302,350
*Miscellanous trout	8,950	10,000	......	100,000	352,500	18,950
Largemouth black bass	.....	1,516	250,000	......	429,400	251,516
†Miscellaneous pond fish	2,020	......	608,500	......	724,350	610,520
Totals	2,119,948	673,887	6,681,632	231,141,721	32,258,742	9,475,467

*Includes lake trout, landlocked salmon, Loch Leven trout, grayling, and silver trout.

†Includes smallmouth black bass, crappie, bluegill sunfish, pickerel, catfish, and yellow perch.

valued at $20,062, yearlings and adults for stocking at $642, and adults for food at $740. These values have been calculated on the selling prices at the point of production.

In 1929 the commercial trout hatcheries in the United States sold 161,835,728 eggs valued at $214,197. This includes 122,732,269 brook-trout eggs valued at $139,387, 35,072,500 rainbow-trout eggs valued at $67,372, 2,355,482 brown-trout eggs valued at $4,070, and 1,675,477 cutthroat trout eggs valued at $3,368. The majority of the brook, the brown, and cutthroat-trout eggs were sold to State and Federal Governments, while the majority of the rainbow-trout eggs were sold to private hatcheries. Sportsmen bought a small amount of both brook and rainbow trout eggs. Brooktrout eggs predominated among those handled in the Eastern Section. The eggs handled in the Central Section were from brook, rainbow, and brown trout; and those handled in the Western Section were from rainbow, brook, and cutthroat trout.

There were 4,296,196 fry and fingerlings, valued at $87,305, sold in 1929. These were sold for stocking purposes, mostly to sportsmen. The fry and fingerlings distributed in the Eastern and Western Sections consisted largely of brook trout, while black bass were more important among the fry and fingerlings distributed in the Central Section.

Adult fish are distributed as fish for food and as fish for stocking. Sales of fish for food in 1929 amounted to 2,810,947 fish, valued at $589,554. The greater bulk of these fish were sold directly to such consumers as hotels, restaurants and individuals, while the remainder, about one-fourth of the total, was sold to wholesale fish dealers who in turn resold to consumers. According to value, rainbow trout was the principal species of trout marketed, making up over two-thirds of the total. Most of these were marketed by hatcheries in the Western Section. Brook trout was the second species in importance in value. These were sold principally by hatcheries in the Eastern Section, although the Western Section also ranks high in sales of this species.

There were 765,924 adult fish, valued at $203,088, sold for stocking in the United States in 1929. Most of these were sold to sportsmen and sportsmen's organizations in the Eastern and Western Sections of the country. Of the total value and number, rainbow trout constituted the greatest percentage, with brook trout of nearly equal importance.

The products sold by the trout and pond fish industries in 1929 had a combined value of $1,094,144. Of this amount, the fish sold for food were valued at $589,554. Sales of eggs were valued at $214,197; sales of adults for stocking, $203,088; and sales of fry and fingerlings, $87,305. Sales of all products in the Western Section were valued at $618,884; in the Eastern Section, $386,098; and in the Central Section, $89,162.

TROUT-FARMING METHODS

Water Supply—Springs and streams constitute the water supplies used by commercial trout hatcheries, but generally when streams are used they are operated as auxiliary water supplies. Water supplies are always tested as to their suitability, and even if adaptable, they may become unsuitable through pollution or disease.

Equipment—As the Bureau of Fisheries has been a pioneer in the practice of fish culture in the United States, and as its activities in this line are more widespread than those of any other agency, a large proportion of the hatcheries were built, and are operated in the same way as those built and operated by the bureau. While a large number of structural variations are noticeable, such variations are productive of the same results as those obtained by Government hatcheries, and

(Continued on page 27)

High Level of Production Establis

Number of Domestic and Commercial Users Rises;
Prices at Wells.

THE natural gas industry established a new high production record in 1930, although its expansion was not as great as in 1929, according to a statement released for publication recently by the Bureau of Mines, Department of Commerce.

The increase in production amounted to 1.3 per cent, it was stated, and the number of domestic (including commercial) users increased 7 per cent over 1929. Exports of natural gas to Canada and Mexico in 1930 showed a "material increase" over the previous year.

PRICES AT WELLS DROP

The average prices at the wells continued to decline, and this decline was reflected in the prices paid by industrial consumers, the largest users, according to the statement.

An average price of 63.5 cents per 1,000 cubic feet was paid for all gas burned by domestic and commercial consumers, the total value being $239,173,000. This average price, the Bureau stated, was the highest so far recorded, representing an increase of 1.5 cents over 1929. The strictly domestic users paid an average of 67.4 cents in 1930, as compared with an average of 46.8 cents for the commercial consumers.

GEORGIA PAYS HIGHEST

The highest price recorded for the strictly domestic users was $1.417 per 1,000 cubic feet paid by consumers in Georgia, and the lowest was $0.446, paid by Wyoming consumers.

The interstate transportation of natural gas, while not increasing as greatly as in recent years, showed a gain over 1929 of 17 per cent. The Bureau of Mines estimated that as of July 1, 1931, there were approximately 50,000 miles of natural gas trunk lines in the United States, as compared with 40,000 miles in 1929.

The Bureau's statement follows in full text:

Although the natural gas industry in 1930 fell far short of repeating the expansion of 1929, it established a new high production record of 1,943,421,000,000 cubic feet, says the Bureau of Mines, Department of Commerce, in a statement prepared by G. R. Hopkins, economic analyst. This represents an increase over the previous year of 1.3 per cent, which, though considerably below the average annual increase for the past decade, represents a creditable showing in view of the curtailment in the production of crude petroleum.

Exports of natural gas to Canada and Mexico in 1930 amounted to 1,798,000,000 cubic feet, a material increase over the pevious year. This resulted chiefly from increased deliveries to Mexico following the completion of the pipe line from the Jennings field in Texas to Monterey. During the year, 21,000,000 cubic feet of natural gas were piped into Montana from Canada.

Adding the imports and deducting the exports gives 1,941,644,000,000 cubic feet as the total consumption within the United States in 1930. The number of domestic (including commercial) users of natural gas continued to increase and amounted to 5,448,000, a gain over the previous year of 7 per cent.

This increase reflects the completion of the major part of the system from the Monroe-Richland field to Atlanta and the addition of numerous branch lines to existing systems. Although the average consumption per domestic user was less than in 1929, the proportion of the total consumption utilized for domestic purposes rose from 19 to 20 per cent and the percentage used for industrial purposes accordingly fell from 81 to 80 per cent, the same as in 1927 and 1928.

The quantity of gas treated for the recovery of natural gasoline in 1930 amounted to 2,088,788,000,000 cubic feet, or 107 per cent of the quantity produced and delivered to consumers. The excess treated represents largely gas produced from oil wells which are so located as regards the fuel markets that the residue gas is valueless and is wasted. The average prices of natural gas at the wells continued to decline and in 1930 amounted to 7.6 cents per 1,000 cubic feet, as compared with an average of 8.2 cents in 1929.

This decline in natural gas prices at the wells

ed By Natural Gas During Year

xports to Canada and Mexico Substantially Larger; ntinue to Decline

was reflected in the prices paid by the largest users, the industrial consumers, who paid an average of 11.3 cents in 1930, as compared with 12.2 cents in 1929.

The total production of natural gas in the United States during 1930 amounted to 1,943,421,000,000 cubic feet, an increase over 1929 of 25,728,000,000 cubic feet, or 1.3 per cent. This total does not include the quantity of gas blown into the air in flush oil fields.

TEXAS STRENGTHENS HOLD ON FIRST PLACE

Texas, the leading natural gas producing State in 1929, strengthened its hold on first place in 1930, when its output was 517,880,000,000 cubic feet, an increase over the previous year of 11 per cent.

This gain was due principally to increased output from the Panhandle, the starting point for the majority of the large pipe-line systems which originate in the State. Production in Oklahoma, the second-ranking State, showed a small decrease in 1930, as the decline in output of the Seminole district exceeded the gain in the Oklahoma City field.

California also reported a slight decline of the oil fields and the small number of new discoveries.

Production in Louisiana increased in 1930 as an aftermath to the expansion of pipe-line systems originating in the Monroe and Richland fields. Some of the States reported material declines in output of natural gas in 1930; the most notable were West Virginia and Pennsylvania, which rank fifth and sixth, respectively.

Production in Michigan in 1930, was less than half of the 1929 total, evidence of the rapid decline of the Muskegon field and the failure of drilling to uncover other sources of supply.

Because of the curtailment in drilling, the number of gas discoveries in 1930 undoubtedly fell below the 1929 total. However, the number of gas wells completed was practically the same for the two years—2,866 in 1930, as compared with 2,870 in 1929. The total initial production of the 1930 completions probably constituted a new record as an increasing proportion of the wells was drilled with the object of establishing a gas reserve to insure the operation of the various large pipe-line systems. The possibilities of Kentucky as an important source of supply were seriously considered, and the number of gas wells brought in during 1930, was practically double the 1929 completions.

SUBSTANTIAL GAS RESERVE IN SOUTHWEST KANSAS

A substantial gas reserve was set up in the Hugoton field of southwest Kansas, through the completion of approximately 80 wells in 1930. This field will be used principally as a supplementary source for several of the pipe-line systems running north from the Texas Panhandle. The Jackson field of Mississippi came in for considerable development work in 1930, and a number of very large wells were completed. This reserve will be used to supply the pipe-line system running into Alabama and Georgia.

The completion of comparatively large wells near Tioga, Pa., and Dundee, N. Y., in 1930, greatly increased interest in the possibility of supplying New York City, and New England, with natural gas.

The total consumption of natural gas, computed by deducting exports to Canada and Mexico from the total of production and imports, amounted in 1930 to 1,941,644,000,000 cubic feet, an increase over 1929 of 1.3 per cent. The practice of storing gas in depleted sands in periods of low consumption progressed during the year, but the amount stored in 1930 was not regarded as large enough to affect the consumption figures. Of the total consumption, 1,565,237,000,000 cubic feet, or 80 per cent, was consumed for industrial purposes, and 376,407,000,000 cubic feet, or 20 per cent, was utilized by domestic and commercial consumers. In comparison with 1929, these data indicate a slight growth in relative importance of the domestic consumption.

The number of domestic consumers of natural gas showed a material increase in 1930, although the gain was much less than that experienced in 1929. The number of domestic consumers in 1930 amounted to 5,448,000, an increase over 1929 of 350,000, or 7 per cent. Beginning with 1930, the classification of domestic consumers was divided into two classes, namely, the strictly domestic or home users, and commercial consumers, such as stores and shops. The number of strictly domestic users amounted to 5,095,500, the number of commercial consumers totaled 352,680, a ratio of about 14 to 1. Three States, namely, Alabama, Georgia, and Nebraska, were added to the consuming States in 1930, which brings the total, exclusive of Alaska, to 30.

TOTAL CONSUMPTION REVEALS INCREASE

The total consumption of natural gas for domestic and commercial purposes in 1930 amounted to 376,407,000,000 cubic feet, an increase over the previous year of 5 per cent. The average consumption per domestic consumer continued to fall off, and for 1930 amounted to 69,100 cubic feet, as compared with 70,600 cubic feet in 1929. On the basis of the prevailing prices, each domestic customer paid an average of $4.39 for natural gas in 1930, as compared with an average of $4.38 in 1929. The increased cost in the face of a drop in the total used resulted from an increase in the average price.

The gas burned by domestic and commercial consumers in 1930 had a total value of $239,173,000, or an average of 63.5 cents per thousand cubic feet. This average price, the highest so far recorded, represents an increase of 1.5 cents over 1929. The strictly domestic users paid an average of 67.4 cents per thousand cubic feet in 1930, as compared with an average of 46.8 cents for the comercial consumers. The highest price recorded for the strictly domestic users in 1930 was $1.417 per thousand feet paid by consumers in Georgia; the lowest was $0.446 per thousand, paid by the Wyoming consumers.

The total consumption of natural gas for industrial purposes in 1930 amounted to 1,565,237,000,000 cubic feet, an increase over 1929 of .5 per cent. Of the total, 723,165,000,000 cubic feet, or 46 per cent, was used for field purposes; 266,625,000,000 cubic feet, or 17 per cent, was used in the manufacture of carbon black; 120,290,000,000 cubic feet, or 8 per cent, was burned as fuel by electric public-utility power plants; 98,842,000,000 cubic feet, or 6 per cent, was utilized as fuel at petroleum refineries; 41,256,000,000 cubic feet, or 3 per cent, was burned at Portland cement plants, leaving 315,059,000,000 cubic feet, or 20 per cent, for miscellaneous industrial purposes.

The use of natural gas as fuel in the field was again the most important class of industrial consumption. The quantity so used increased from 705,083,000,000 cubic feet in 1929 to 723,165,000,000 cubic feet in 1930. This increase was somewhat surprising in view of the declines in drilling, and in the production of natural gasoline. Oklahoma, California, and Texas, the three leading crude producing States, were the leading consumers of natural gas for field purposes.

ITS USE IN MANUFACTURE OF CARBON BLACK RISES

The use of natural gas in the manufacture of carbon black, the second most important class of industrial consumption, increased from 261,107,000,000 cubic feet in 1929, to 266,625,000,000 cubic feet in 1930. This gain, while important, was much less than that recorded in 1929.

The total consumption of natural gas as fuel under stills and boilers at petroleum refineries in 1930, amounted to 98,842,000,000 cubic feet, a decline from the previous year of 4,887,000,000 cubic feet, or 5 per cent. The decline in the use of natural gas as refinery fuel was faily general and resulted chiefly from a decrease in the quantity of crude oil processed.

The consumption of natural gas by electric public-utility power plants amounted to 120,290,000,000 cubic feet in 1930, an increase over 1929 of 7 per cent. This figure constitutes a new record for this class of consumption, although the percentage increase was much below that of 1929. Natural gas is used by public-utility plants in 18 States; the two most important consumers are Texas and California.

The consumption of natural gas by Portland cement plants in 1930 remained practically unchanged from 1929; the total in 1930 was 41,256,000,000 cubic feet, as compared with 41,643,000,000 cubic feet in 1929. During 1930 natural gas was used as fuel at 28 Portland cement plants located in 10 States, as follows: Alabama, Arkansas, California, Colorado, Kansas, Missouri, Nebraska, Oklahoma, South Dakota, and Texas.

The heading "Miscellaneous Industrial Consumption" covers consumption of natural gas by steel plants, glass works, ice plants, brick and terra cotta establishments, and many other industries where the absolute control of temperature is absolutely necessary. A total of 315,059,000,000 cubic feet was consumed by the miscellaneous industries, a decline of 5 per cent from 1929.

PRODUCING WELLS GREATER IN NUMBER

The approximate number of producing gas wells, as of Dec. 31, 1930, totaled 55,020, an increase over the previous year of 1,475. The total number of gas wells completed in 1930 amounted to 2,866, which indicates that there were about 1,400 gas wells abandoned during the year. Pennsylvania, with nearly 20,000 producing gas wells on Dec. 1, 1930, again ranked first; West Virginia, with 12,983 gas wells, was again second. The small average size of the gas wells of the Eastern States makes it imperative to have a large number of wells upon which to draw and necessitates the drilling of many new wells—thus, while the States east of the Mississippi produced only 18 per cent of the total output in 1930, they had 81 per cent of the producing gas wells as of Dec. 31, 1930, and were credited with 51 per cent of all the gas wells brought in during the year.

The number of gas wells completed during 1930 amounted to 2,866, a decrease of four from the 1929 total. This figure does not include completions in California, for which State the record is lacking. However, the number of strictly gas wells in California is comparatively small. Ohio, with 653, was again the leading State in number of gas-well completions in 1930. This figure represent a material decline from 1929; nevertheless, the State showed a gain of 9 per cent in output. Texas, Oklahoma, and West Virginia, with 483,-403, and 397 completions, respectively, followed Ohio in rank. Of these, only Oklahoma showed an increase in production over 1929.

The interstate transportation of natural gas has shown a rapid growth in recent years, particularly in 1929, when several large lines traversing several States were completed. In 1930, the growth in interstate deliveries was more conservative; nevertheless, the quantity transported between States showed a gain over 1929 of 17 per cent, and for the year amounted to 380,600,000,-000 cubic feet.

The largest single interstate movement of gas was again that from West Virginia to Ohio, although the movement from Oklahoma to Kansas was almost as large. Other important interstate deliveries were those from Kansas to Missouri, from Kentucky to West Virginia, from Louisiana to Arkansas and Texas, from Texas to Colorado, and Oklahoma, and from West Virginia to Pennsylvania. The States which have large quantities of excess gas over and above their consumption are Louisiana and West Virginia, hence the interstate movement from these States is large.

It is difficult to estimate the total mileage of the natural gas pipelines, chiefly because there is no definite dividing line between trunk lines and gathering lines. Furthermore, it is virtually impossible to ascertain when work on new lines was started and completed. However, it is believed that as of July 1, 1931, there were approximately 50,000 miles of natural gas trunk lines in the United States, as compared with 40,000 miles the previous year.

Although the number of large pipeline systems completed in 1930, probably fell below the 1929 record, the number of individual projects undoubtedly showed an increase and the total mileage laid was possibly higher than in 1929.

BIRD-BANDING

(Continued from page 7)

Banding also serves to illustrate the marvelous sense of direction birds possess. Small garden birds of the south have been captured two and three times over a period of a few years as far north as the Hudson Bay.

Some operators band only special species of birds. I understand that at the present time a study is being made to determine the winter quarters of the little chimney swifts. It seems that no one knows just where the little chimney swifts spend their winter months. The work of Stoddard and Handley in banding this species of birds by the thousand near Thomasville, Georgia, may soon solve the mystery. My old grandmother use to advance the theory that they buried in the mud during the winter. Who knows? Expeditions to the tropics have so far failed to find them. Perhaps some day we will find them spending their winters all in one great big mammoth cave in the lost world of South America.

Another fact being established by bird-banding seems to prove beyond a doubt that wild animals live on one another. An eight foot alligator killed near Charleston carried in his stomach five bands of herons which had been placed but a few months before. While this incident establishes little of bird travelings it certainly proves beyond a doubt that the Mr. Alligator relishes a heron dinner, and perhaps many other water birds.

Suggestions are being offered to band or otherwise mark wild animals. In fact deer and smaller game animals have been successfully banded already. No doubt, as the banding of wild life progresses, all species of wild life will be gradually included and important knowledge will be established.

P .S.—Perhaps the time will come when we will have to band our own young ones, in this age of flying machines.

Louisiana Nature Guardians

"Upon my honor, as a Louisiana Nature Guardian, I promise to take care of all our natural friends, to guard and protect them to the best of my ability, and as far as possible influence others to do the same."

When the Nature Guardian Club of Louisiana was formed several years ago, it met an instant and hearty response from the teachers and the school children all over the State. From a small interested group it has grown steadily into a mighty force of thousands of young conservationists. These children are the proud possessors of handsome lithographed badges, and certificates of membership. New Clubs are being formed each week and it is the purpose of the Educational Bureau to enroll every Louisiana boy and girl, white or colored, under the Nature Guardian banner.

HOW YOU CAN BECOME A NATURE GUARDIAN

YOUR PART

Consult your teacher.

Ask that the purpose and plans of the Nature Guardian Club be explained to you and the class.

Ask for an application card.

Get a responsible person to indorse it, after proving that you fully understand the duties of a Nature Guardian.

Sign the application and mail the card postpaid, or give to your teacher, to send with cards from all the class.

OUR PART

We send the application card.

We send you a handsome badge, a certificate of membership, Nature Guardian pamphlets and other literature.

This is all free, and is carried on with the purpose of instilling into the children's minds a knowledge of Louisiana's wild life and a thorough understanding of its economic value to the State.

It also aims to develop individual humanitarianism. Even within this short time an amazing improvement has been made in the mental attitude of our young folks toward the conservation and protection of Louisiana's natural resources.

EDITORIAL

MY DEAR GUARDIANS:

It was my very great pleasure to listen to a most entertaining lecture on bird calls some time ago, given by Dr. J. M. McBryde, of Tulane University, at the Lecture Auditorium of the Department of Conservation. The speaker interpreted the songs of the wild-wood singers in the most sympathetic manner, and if one had heard him in forest or field one would have thought the birds actually present, so true to nature were his imitations.

How many Guardians know the notes of the different song birds? How many can imitate the most common calls? It would be a very pleasant and a very instructive pastime this spring to go to the near-by woods and try to identify the different birds and to learn their calls. Any boy or girl who can whistle, and nearly all can, could easily learn to mimic bird notes. We wish every Guardian would learn to identify at least *ten* birds each spring, and to learn their calls.

F. Schuyler Mathews, in his "Fieldbook of Wild Birds and Their Music" records a great many bird songs, giving the notes and musical rhythm of the bird music.

How many Guardians will try to do this this spring?

With love for Guardians, one and all,

THE EDITOR.

A THOUGHT FOR TODAY

I PROMISE

To help protect plants, trees, and flowers everywhere.

To do my best to sow seeds or plant trees and flowers at least once a year.

Not to throw broken crockery, tins, paper, or any other rubbish in my yard or in the streets.

To do all I can to prevent forest fires.

To help make my town healthful and beautiful.

The above is just a reminder for Louisiana Guardians!

A HUGE BIRD HOUSE

What is almost certainly the biggest bird house in the world is to be found in the town of Campinas, about 40 miles from Sao Paulo, Brazil. Here is a building in which more than a hundred thousand swallows nest each season. The way in which the bird house came to exist is interesting. Some years ago the people of Campinas found that their market hall was totally unable to accommodate the increasing number of people who wished to do business there. It was decided to pull down the old hall and build a new one. Then, some of the citizens pointed out that the market hall had been much used by swallows for nesting. Campinas is the center of an important agricultural area where sugar, coffee and other crops are grown. Many of the planters realized that swallows were their good friends on account of the large number of insects which they consume. These men joined with the people of Campinas in a protest against the pulling down of the market hall. Accordingly it was decided to leave the building and erect a new one in quite a different locality.

The old market hall serves as a bird house in which enormous numbers of swallows build their nests and rear their young. When the birds are absent during the period of migration the whole of the building is carefully cleaned so that it may be ready for the next nesting season.

Here is a description of the Bok Corillion, in Florida that is clipped from the "American Press," of Lake Charles:

Dear Editor: In 1928 I visited Bok Tower. It was the day President Coolidge dedicated it to the public. I saw President Coolidge as he unfolded the longest silk flag in the world. The tower was built by Edward Bok and given to the American public. When he died he was buried under the tower.

It is situated on Mountain Lake in Lake Whales, Florida. It is 324 feet above sea level. From the top of it you can see 36 lakes. The tower is named "the singing tower," because of the bells. It is 250 feet high, 51 feet wide at the bottom and 21 at the top. There are 61 bells in the top, they are the largest ever made.

Around the grounds there are birds of all kinds and thousands come there every year.

Yours truly,
PAT HARROP.

THE SILK WEAVER

BY FREDERICK J. FORSTER

I saw a speckled spider
Weaving in the sun,
I said, "who'll wear your wonder silk
When your weavings done?"

The spider answered, "Why, sir,
The woodland fairies do,
For every time they dance, sir,
Their dresses must be new.

"New and dainty, too, sir,
Of silken fabric fine,
And no one in the world can weave
Such silver silk as mine."

Nature Guardian Editor,
Dept. of Conservation
New Court Bldg.,
New Orleans, La.

DEAR EDITOR:

I have been reading the Louisiana Conservation Review for a long time now and I have seen many films on Wild Life in Louisiana. I think I understand all the duties of a member and I also think I will be able to carry them out.

The wild life has always and always will be a very interesting subject to me. I will do all I can to guard nature around my home and help others to see the necessity in doing so.

Therefore, if you will send me an application card I will fill it out as quickly as possible and work much harder than before in upholding the rules of the club.

Thanking you in advance I am,

Yours very truly,
ANITA C. DONALDSON,
2407 Burgundy St.,
New Orleans.

Come in quickly Anita! You are just the sort of girl who makes an ideal Nature Guardian!

I WISH!

I wish I had been grandpa's child
That I could have had the joy
Of fishing in those good old days
When father was a boy.
For then the fish grew bigger far
Than they do nowadays
And literally packed the streams—
At least, so father says.

They never caught a sucker then
That didn't weigh a ton,
And pickerel were longer than
A modern twelve inch gun.
They used to yank out halibut
In hundreds from our bays,
And perch ran up the banks to bite—
At least, so father says.

They never thought of using bait
To lure the wily trout;
They reached a bushel basket down
And simply yanked them out.
And in about an hour or two
They'd fill up several drays
And show them through the neighborhood—
At least, so father says.

Just a few of our members:

Henrietta Tucker,
Dunn, La.
Julia Mary Wiggins,
Delhi, La.
Mrs. W. E. Hixon,
Mangham, La.
Mary Alice O'Neal,
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Varietta Green,
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Ellanor Gray Hudson,
Rayville, La.
Adron Jas. Morgan,
Rayville, La.
Charlie Mullins,
Rayville, La.
Margie Fae Denton,
Delhi, La.
Doris Benedict,
Taylor, La.
Norfleet Rogers,
Rayville, La.

We shall be glad to hear from our members at any time, and shall be glad to print their poems, themes, and letters about any of the natural resources of Louisiana. We hope that our next issue will contain many interesting articles by members of our Club.

Address all letters to: NATURE GUARDIAN EDITOR, DEPARTMENT OF CONSERVATION, New Court Building, New Orleans, La.

PREVENTING POLLUTION OF RIVERS

(Continued from page 10)

the sanitations experts, the chemists, the doctors and the welfare experts have told New York repeatedly what is wrong; what should be done and what will happen if something is not done.

Now the State Legislatures have created a body that is expected to propose a feasible method of doing this particular job.

It is not entirely as simple as its sounds. It must be borne in mind that a sanitation program of the size that is contemplated, means the expenditure of one billion or more dollars. The proposal, already submitted by New York City's Sanitation Commission, for the city alone, calls for the expenditure of $377,000,000.

And it is the taxpayers and rentpayers who must, in the end pay the bill, and it must be paid without putting an unnecessary burden on the taxpayers.

The Commission is going to give considerable study to the financing of this problem and that really will be one of the major features of the Commission, secondary only to the ending of the pollution. They have to work together.

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REVIEW OF THE FISH FARMING INDUSTRY OF THE UNITED STATES

(Continued from page 19)

require the same methods in operating. The hatchery equipment consists of troughs through which water is run at a certain depth, and in which wire egg trays or baskets are suspended. The wire in the trays or baskets is such that when the eggs hatch, the fry can fall between the strands of the wire onto the floor of the trough. The floor of the trough is divided so that the fry are kept from crowding. Many variations are used in the methods of suspending the eggs in the troughs, but the chief requisite is a stream of suitable running water in contact with the eggs.

In the trout industry, ponds vary in size so much that no special size can be stated as being necessary. The ponds should be small enough so that they may be seined easily and should be capable of partial or total drainage. Earthen, wood, and concrete ponds are used in all sections of the country.

Production Methods—When the brood fish are spawned the fertilized eggs are placed in trays in the hatchery. Dead eggs are removed to avoid infection of the living eggs. Each fry has been provided by nature with a yolk sac which supplies food until the fish is able to take artificial food. When the yolk sac is absorbed, or later, depending on the practice of the culturist, the fry are moved to outside "fry ponds," which are usually smaller than the ponds in which the yearling and adult fish are held. Artificial food consists of ground beef liver for the fry, but the high price of this food forces the fish culturist to seek other foods for his older fish. Other foods are introduced after the fry are well started feeding on beef liver. Horse meat from wild horses; lungs, hearts, livers, and spleens from hogs, sheep, and cattle; herring; spawned-out salmon; shrimp meal; buttermilk; and dried milk are all used with success. Another food consists of dried salmon eggs, which was being used experimentally in 1929. In preparation, these are often mixed with varying quantities of beans, wheat middlings, and cod-liver oil and are fed both raw and cooked. Fish of similar sizes are kept together, and the giants and runts are graded out at set intervals.

Diseases are diverse and many. They are apt to appear at any time when aided by favorable conditions and often cause the greater part of the losses experienced by the culturist. Clean hatchery equipment and ponds are the best safeguards against disease, while in many hatcheries eggs and fish are treated with salt and with acetic-acid solutions regularly to guard against diseases. In Fisheries Document No. 1061, entitled "Care and Diseases of Trout," Dr. H. S. Davis describes the appearances and treatments of the more common ailments.

In addition to disease, natural enemies are important factors in the loss of fish. Kingfishers, herons, bitterns, crows, sea gulls, and wood ducks are all tremendously destructive, while rats and snakes add to the loss.

There are variations in the rates of growth of trout in all hatcheries. Growth varies with feed, temperature of the water, species of fish, and are with the chemical and physical character of the water itself. Trout are usually ready for market as food fish (2 to 6 to a pound) in from 12 months to 2 years after hatching. Then, if not sold for food, they are kept for brood stock or are sold for stocking purposes when they are in the fry and fingerling states. Brook trout spawn for the first time when two years old, but eggs are not taken from any of the trout as a general practice until the fish are three years of age.

Shipping Methods—For transporting eggs special containers are used. There is much variation in the structure of these containers, but in general they consist of an outside insulating casing with a hinged cover, said casing usually made of wood lined with cork, and an inside box in which the eggs are packed in single layers on trays. To keep the temperature constant, and the eggs moist, an icy tray is placed on top of the egg trays, and the ice tray is refilled at points along the route of shipment. In operation, the ice melts, cooling the container, and the water dripping down over the eggs keeps the shells moist, while moss serves to retain the moisture. The excess water drains out of the box through holes in the bottom of the container.

Another method used to a limited extent in transporting trout eggs for short distances, is the method of bulk packing, where the eggs are packed in a mass instead of in single layers on trays. For this method, square frames 2 to 3 inches deep are used. These frames are divided into four compartments, and have the bottom side covered with fine-mesh wire or muslin. The eggs are packed in the compartments in damp moss. The frames are then packed in the same kind of a casing tray, with an ice tray on top. Eggs are packed at the hatchery, shipped by express, reiced at prearranged points and received at their destination, where they are unpacked, and carefully acclimated to any change in temperature.

Fish transported alive are shipped almost entirely in 5 to 10 gallon cans on motor trucks. Air

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is provided to the water through surface aeration and splashing. Oxygen tanks and air pumps to supply oxygen and air to the water are safer, however, and are used, when available, for trips over 100 miles.

Trout to be used as food are shipped mainly in the round by express. They are packed in ice in wooden boxes that hold about 30 pounds of fish. In a few localities the trout are eviscerated before shipping, and in a few localities the fish are partially protected from the melting ice by layers of paper or other materials.

Distribution Methods—Distribution of eggs and of fingerlings, fry, and adults for stocking is accomplished through the efforts of the individual hatchery man. Up to 1930, there has been little difficulty in selling these products and no special sales efforts have been necessary. Some hatcheries have had orders for their total production on file for several years in advance. The volume of the sales is determined by the stock on hand, and the policy of all commercial trout hatcheries calls for the sale of all surplus eggs and fish. In this way all equipment is kept in use and overcrowding is avoided.

The distribution of trout for food in the United States is managed mainly by the individual hatchery. Other sales agencies include two cooperative organizations and several salesmen for individual hatcheries. Approximately half of the fish marketed are sold direct to the consumer at the hatchery, while the rest of the trout are shipped to wholesale dealers, hotels, restaurants, dining cars, and individuals. With present marketing methods, most of the trout are eaten within 24 hours after leaving the water. In this way the consumer has been assured of a fresh product.

Trout for food are sold as specialties, as the cost of production is high and the risk is great. They are popular for banquets, in restaurants, and in the dining rooms of high-class hotels, and resorts. Dining cars throughout the Southwestern part of the United States are noted for their trout dinners. Names used by the trout industry, such as "Eastern Brook Trout," and "Rocky Mountain Rainbow Trout," try to describe the desirability of these fish. Numerous restaurants display live trout in aquaria in their windows. Diners are there enabled to select the trout they wish and have it cooked for them.

A large number of hatcheries sell to anglers, who catch the fish in the hatchery ponds with hook and line. After being caught the fish are weighed, eviscerated, wrapped by the attendant, and taken home by the angler. A few of these establishments are equipped to cook the fish as they are brought in. Such hatcheries have lunch-room, picnic, or fish-dinner facilities, and may have recreational equipment operated in conjunction with the fish hatchery.

Many trout are sold in the round to consumers at the hatchery. To care for this business, the inspector of the hatchery keeps the proper-sized trout available in a small pond, where wire boxes are frequently used to hold the fish prior to sale. The fish are removed by dip net. They are then weighed, sometimes cleaned or eviscerated, and wrapped for the customer.

On the Pacific coast, in the Mississippi River region, from the Great Lakes south to St. Louis, and in the North Atlantic States, all large cities are served by the trout industry. While a large number of concerns are still operating on an experimental basis, a few years will tend to stabilize production, and will undoubtedly allow the products to become better known through larger sales and advertising.

POND FISH FARMING METHODS

Water Supply—Ponds form the natural habitat of pond fishes or warm-water fishes. In the pond-fish industry these are formed artificially by excavation, or dyking, or by a combination of both. Temperature requirements are higher than in the trout industry, and thus they naturally confine the industry to a region further south. In contrast to trout ponds, ponds for warm-water fish should have a minimum of water flow and need only enough water added to compensate for drainage and evaporation.

Production Methods—Brood stocks are planted in the ponds and allowed to propagate naturally. There they build nests and lay their eggs. After hatching, the brood stock may be removed, or the young fish may be removed. In such cases, the young fish are isolated in a pond, or in ponds where there is plenty of plant growth, and there they find their own food. If enough food is not present naturally, extra food may be provided artificially. Under favorable conditions the fish will develop rapidly, and need be distributed only when sorting or for removal. For the purposes of sorting or removing fish or killing vegetation, the pond is drained. This crowds the fish into a small volume of water and facilitates their removal with dip nets or seines. If the fish are to be shipped to other waters, they are placed in large cans of water similar to those for trout and transported in trucks or by rail. Shipments of this nature are often en route up to two days. Messengers are usually sent along with these shipments to care for the fish and aerate the water. To prevent fouling of the water, the fish are not fed for several days before shipping.

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Distribution Methods—Sales of pond fishes are handled by the producer. At the present time, very few pond fish are sold in the round or eviscerated condition for food, as there is always a good demand for them for stocking private and public waters where they may be taken later by an angler. As there are fewer pond-fish producers than there are trout producers, and they are less scattered over the United States, shipments of pond fish generally travel much greater distances to market than do shipments of trout. Consequently, unit transportation costs are greater in the pond-fish industry than in the trout industry.

GOLDFISH-FARMING METHODS

Methods used in commercial goldfish production are described by Thomas Quast (1929) in Fisheries Economic Circular No. 68, entitled "Goldfish Industry." In general, they are farmed much like the pond fishes, propagation of which has been described in this report.

FISH-RAISING INDUSTRY

In addition to the fish farmed in the trout, pond fish, and goldfish industries, carp and buffalofish also are raised commercially in the United States to an appreciable extent. However, quantities of these fish are obtained from natural sources, and impounded pending sale. While being held these fishes are fed whole shelled corn to fatten them and to increase the firmness of their flesh. These are marketed in the round, or eviscerated, and also alive in the larger population centers of the United States.

Railroad cars used in transporting carp and buffalofish alive are supplied with tanks, which are filled with water, the water being aerated by pumps attached to the car's axle. The fish are transported from the railroad cars to retail stores by trucks equipped with tanks. At the retail dealer's establishment they are held alive in tanks supplied with running water until they are sold.

New York City is the chief market for live buffalofish and carp, although considerable quantities are sold in St. Louis and other large cities, which have equipment for handling live fish. These fish come from points on the Great Lakes, (notably Lakes Huron and Erie) and points in the Mississippi River region.

Some idea of the potential market for live carp and buffalofish may be gathered from the fact that over 5,000,000 pounds were sold in New York City alone in 1924 (Fiedler, 1926). A conservative estimate places the annual consumption of carp and buffalofish from feeding ponds and natural sources in the United States at 40,000,000 pounds, with a value of $2,000,000.

NATURE RECLAIMS ARTIFICIAL LAKES

(Continued from page 12)

tain likewise reappeared in spots where a little new boggy shore had grown.

At the shallow heads of the numerous coves, waterweeds, eelgrass, pondweeds, hornwort, duckweed, and sphagnum and other mosses, are beginning to form a mat of live and dead vegetation, which slowly reproduces the original conditions about the shores of Big and Little Cedar Ponds that existed before their damming and joining into Lake Tiorati 17 years ago.

The same process may be seen in other lakes, in degree according to the date of their damming. It has proceeded a good ways in the Kanawauke Lakes, the earliest to be constructed. Later water bodies are relatively raw as to natural shore conditions, but grow more natural yearly, and with the permanently maintained levels of these new lakes, they will in time all develop the softened outlines given them by the associations of the aquatics.

The gradual naturalization of these artificial lakes in the Harriman Park is but another phase of the return to nature shown in all the vegetation of this forest preserve of 45,000 acres. It has been more obvious in the forest cover, which, with the natural increment from the hardwood sprouts after the last cutting, is becoming yearly denser and affording a thicker cover for the understory of shrubbery and the ground flora off herbaceous flowering plants, ferns, club mosses, mosses, fungi, and lichens,; and likewise a sanctuary for deer, for smaller mammals, amphibia, reptiles and for birds.

On the lake shores, the observer familiar with conditions on the edges of natural water bodies, missed something for a time after the new lakes were made, the border of shore and shallow water plants. Now nature is replacing them, and with permanent water levels, will gradually and uninterruptedly restore conditions as they should be. Such shore vegetation helps to enrich the minute animal life, on which amphibia, fish and birds dependsin their turn upon each other. The return of the white young of the little blue herons and even a few egrets to the Harriman Park lakes, is evidence of the increasing richness of food supplies.

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HOW OLD ARE THE LIVE OAKS?

(*Continued from page 5*)

isiana and upon exhaustive inquiries as to their age so far as it is known or can be fairly estimated, I have reached the conclusion that under ordinary conditions a live oak tree measuring seventeen feet in circumference at a distance of four feet above the ground is approximately 100 years old.

The typical example of observations from which this deduction is made is the Gebert live oak in New Iberia. This tree is the most conspicuous natural object to be seen by one driving through what may just be called the most beautiful street in Louisiana, Main Street, New Iberia. The tree stands in the center of the walk in the front yard of the Gebert home. It is a beautiful sight. And situated as it is, directly on the main line of the old Spanish trail, it is the admiration of thousands of tourists each year. I photographed and measured it on October 15, 1930. Its circumference four feet above the ground was at that time exactly seventeen feet, the spread of its branches 105 feet. Its age is definitely known. The tree was set out by Mrs. Elizabeth Morse Marsh over the body of her infant son, Jonas Terrell Marsh, who died July 29, 1831. The tree was about ten years old and Mrs. Marsh said that it was "about the size of her arm" when she transplanted it. Mrs. Marsh was a first cousin of Samuel F. B. Morse, inventor of the telegraph, and was a native of New Jersey. This information was given me by her great-grand-daughter, Mrs. J. W. K. Shaw, of New Iberia.

Allowing for the fact that the growth of the tree was retarded by its transplanting, and also for the fact that the growth was enhanced by care and cultivation on account of its special sacredness, I think it may be fairly assumed that seventeen feet is about the typical circumference of a live oak tree 100 years old.

Other data that I have gathered as collateral to this general estimate are the following:

The Crow live oaks which were planted in Lafayette from the acorn now measure on the average thirteen feet six inches in circumference at a point four feet above the ground. These oaks were planted by the late Basil C. Crow on his old home place in 1856. The place has long since been sold and subdivided into what is now the Elmhurst addition (named Elmhurst by its purchaser, Mr. Hedges of Iowa, probably for the reason that there was not an elm anywhere in sight!). Mr. Crow was the father of the late Mrs. Maxim Crow Girard.

The Century live oaks, eighteen in number, which were planted on the campus of Southwestern Louisiana Institute on the first day of the present century, January 1, 1901, now average, after 30 years, six feet six inches in circumference four feet above the ground. They must have been from five to six years old when set out. So we have three stages of growth to make our estimates upon, from accurate and verified data. We have the sizes, in circumference of trunk, of live oak trees for three periods: thirty years, seventy-five years and one hundred years.

Nevertheless, these giant oaks whose trunks measure from twenty-five to thirty-three feet in circumference leave us in doubt as to whether they transcend the span of two, three or more centuries. We shall have to have scientific checking up and corroboration of years of growth as shown by accurate examination of cross sections of the largest existing trees. It may be conceded that live oaks may grow to be a thousand years old, in spite of the fact that none of that age and corresponding sizes are to be found today. For it is known that up to a comparatively recent time old live oak trees had an immense money value on account of their use in the building of ships for the world's navies. If there are any old-timers still in existence, as in the case of the Avery Island and Jefferson Island oaks, it will be because their inaccessibility placed them beyond the ruthless hand of the shipbuilder.

The most interesting account on the subject of the culture of live oaks for the use of navies is that of Mr. Jenks Cameron in his articles on "President Adams' Acorns and How They Came to Be Planted at Santa Rosa"; "How America Tried to Grow Trees for Sail of the Line at Santa Rosa"; and "Who Killed Santa Rosa?" published in AMERICAN FORESTS in March, April and May, 1928.

Mr. W. R. Mattoon, of the Forest Service of the United States Department of Agriculture, gives it as his opinion that "the age estimated for the live oak on Avery Island seems altogether improbable. On the basis of considerable information, it seems that the ages of the old and decrepit live oaks in various parts of the South are mostly from one to two hundred years. It is doubtful whether the live oak has any different period of maturing in Louisiana from that on the Atlantic seaboard. It seems likely that the oldest living live oaks are not more than two to three hundred years old."

WHAT SHALL WE DO WITH THE LANDS?

(Continued from page 16)

notwithstanding a large portion of its fish and game are raised in fish hatcheries and breeding pens. These figures are staggering until we stop to consider the tremendous volume of tourist traffic and realize that the call of the great outdoors is an irrestible urge as impossible of suppression as is the ebb and flow of the tide. Why more than fifty million people toured the highways of the United States last year and spent in excess of three billion dollars in quest of diversion—recreation. They are going where they can find it too—and many of them will return, for the tourist of today is the investor of tomorrow.

But what has all this to do with lands—wild life, game birds, fish, conservation laws and tourists? Well, what shall we do with the lands? We must find something for which they are adapted —something to give them power to produce. "In comparatively few places would the *perfect* combination of suitable lands, water, and scenic conditions be found"—and in no place can a more nearly perfect combination of these requisites to a hunting and fishing reservation be found than here in the "great outdoors of the southland." Here we have an equable climate, unlimited water supply of great variety, incomparable natural scenic beauty, and lands of every needed type. And wild life too, in profusion, susceptible to increase by scientific methods of conservation and propagation, to meet the demands of an English hunter. But "private enterprise must be depended upon—the way to make game more abundant is to commercialize it." Neither the state nor the parish or county can do it—nor can the individual landowner. But it can be done through cooperative effort. The lands can be converted into a great wild life reservation—hunting and fishing preserve, that will have power to produce, not only taxes and license for state and parish or county, but profits for the landowner greatly in excess of what may be expected from any other use to which the lands can pressently be adapted.

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(Continued from page 1)

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7. The maintenance of the trees, after planting, will be undertaken by the Highway Commission with the Conservation Commission supplying living trees to supplant those that die from time to time.
8. The beautification of all paved highways in Louisiana can be completed as rapidly in the future as the number of trees available and man power to plant the trees permit.

The plan will be launched in February, and a substantial showing can be made by each Legion City and Town located upon a paved highway, through the planting of as many trees and seedlings as practicable along the approaches to city limits. By extending our Memorial tree mileage, every season, interest can be maintained and the work completed in a relatively short period.

A DAY STUDYING THE GREY HERON

(Continued from page 9)

other birds of prey. The color of the heron is light grey upper parts, black primaries, salty-gray tail, white neck with dashes of dark blue-gray and grayish white breast and abdomen covered with black streaks. The total length of the bird is about three feet. It can be distinguished in flight from cranes and Ibises because of its folded neck. Its call is a hoarse squawk.

The bitterns resemble the herons in some ways, but are different in others. Their method of striking with their beaks for food is the same, but they live singly, or in pairs, nest among the tall grasses of the swamps and marshes; and do not follow established routes in migration.

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Acquisition of Fishing Rights by State for Use of Public

Importance of Providing Opportunity for Larger Group of People to Use Streams Discussed by Colorado Commissioner

By R. G. PARVIN
Game and Fish Commissioner, State of Colorado

FARMERS, everybody knows, are the backbone of the country. Fishermen, I suppose, must be the wishbone. Anyway, the ones I know are always wishing. Just now they are wishing for the good old days when they not only fished through the farmers' front yards, if they wanted to, but probably got invited to stay to dinner and have their fish cooked.

Those days have gone, along with buckboards and quilting bees. When the automobile came, it crowded out more things than horses and buggies. There is no time any more for the leisurely friendliness of slower days, when people visited each other, and the occasional visitor to the farm, be he stranger or friend, was welcome as rain after a drought. If strangers when they came, they were friends when they left.

Now the automobile takes crowds of people into the country where no one went before. And many of the people who are going now have no thought of anything but their own convenience. They cut fences, leave gates open, let stock out, drop matches and lighted cigarettes, and are miles away before anyone can find out who they are. The farmer has been obliged to protect himself from intrusion, and no one blames him.

A proper request is still all that is necessary to get permission to fish across his land as a rule, but he has to know who is fishing. Occasionally the farmer makes fishing streams a source of profit and charges for the privilege of going on his land, but this practice is not general. His main idea is to protect himself, not from fishermen, but from vandals. Naturally, the resort owner posts his property against fishing. Fishing streams are his stock in trade. The better the fishing, the more guests he has; and he doesn't want anybody on the streams unless they are stopping at his place. One can't blame him either.

But lots of people don't own lands with streams on it. They don't care for resorts. So, if they can afford it, they form clubs, buy lands with good fishing streams, and post them so they can go and fish whenever they please, and have only their friends around. That makes it perfect. And one can't blame them.

Then there are folks that work hard and play little. Maybe they live in cities, maybe small towns, maybe in the country. The fish in the streams belong to them just as much as to anybody else. They don't own lands with fishing streams on it either. They can't afford to pay resort prices. Probably a lot of them don't care enough about fishing as a sport to join a club, even if they could afford it. What they want is the privilege of taking the old fishing pole and wandering up the stream when they feel like it—maybe with one or two kids tagging along—catch a few fish, and get away from the irritations of the daily grind. They may not be keen fishermen, but if they like it at all it is the best tonic in the world.

What are we going to do about these people? Fishing is not necessary, of course, but it is pretty generally agreed by sociologists, government economists, and by a good many business leaders that some form of outdoor recreation is necessary for all workers if the strength of our social structure is to endure.

The Colorado Legislature in 1903 enacted a law giving the public the right to fish in any stream in the State stocked at public expense, subject to action in trespass for any damage done to property along the bank of any such stream.

This law was based on a section of the State Constitution which declares that "The water of every natural stream not heretofore appropriated is declared to be the property of the public and is dedicated to the use of the people of the State, subject to appropriation."

The legislative act was annulled by a decision of the State Supreme Court in 1906, (Hartman v. Tresise, Colo. Reports 36) in which the court declares:

"It is the right of appropriation which the general government has recognized and confirmed, and subject to which grants of public lands in the arid States since 1866, have been made. But neither, in this nor in any other clause of our constitution, nor in any act of Congress, is the right of fishery in the natural streams of this State, or an easement over the public domain for its enjoyment, declared to be, or recognized

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as vested in the State; nor has any authority to grant the same to its citizens been conferred upon the State or claimed by it except in the statute cited. This does assume to grant such right and * * * that this act is void for at least two reasons we proceed to show."

One of the reasons shown was that when the State Constitution was adopted, the United States owned the land, and whatever rights and title herein it owned, passed to the purchaser, unless excepted or reserved in the instrument of conveyance or by some act of Congress; and that no act of Congress authorized, nor did the patent contain any reservation of any public right of fishery, or of any easement over the lands to enable the public to enjoy such right.

The other reason was based on the common law which holds that the owner of lands along a non-navigable fresh water steam owns the bed of the stream and the exclusive right of fishery therein to the middle thereof, and if he owns land bordering on both sides, he has exclusive right of fishing in the entire stream, to the extent it flows through his land.

A dissenting opinion was rendered in this case, in which two members of the court concurred. It holds to the view generally taken by the American public that when the natural streams of a State are declared by the Constitution of the State to be the property of the public, and dedicated to the use of the people, there is also dedicated to their use a right of way through the channel of every natural stream of the State, because such right of way is a necessary incident to the full and complete use and enjoyment of the grant, and no private ownership can defeat such right of way.

When this opinion was written in 1906, posted property, was the exception, not the rule, in Colorado. Since that time the entire State has been made accessible to the public by good highways. Automobile travel has tremendously increased, resort projects have sprung up everywhere, farmers have begun to charge for entrance to their lands, and more and more posters appear bearing the forbidden legend, "No hunting or fishing allowed."

The State Game and Fish Department has gone steadily on investing its funds in hatcheries, lakes and equipment until it has one of the finest fish cultural systems in the country, and is prepared to put into the State waters 75,000,000 trout a year, more than present conditions will take care of, but which will amply meet the needs of the State for years to come.

If, however, fishing waters are to be finally controlled by landowners, resort proprietors and fishing clubs, has the State a legal or moral right to go to the expense of raising fish for the waters? We think not.

It is true that many of our public streams have been greatly benefited by the efforts of proprietors of many private fishing preserves. In many places they maintain large rearing ponds at their own expense, feeding and caring for all fish the State will supply, and turn them out every year when they are grown to a fine size. While their own property is posted, there is nothing to prevent the fish from migrating to other parts, and the public gets the benefit. The trouble is, the better it is the more desirable any stream becomes as a fishing preserve, and sooner or later, unless it is government land, it gets an owner who puts up the "no fishing" sign.

There is only one way we can see to give everybody a place to fish, and that is for the State to do what others are doing, and do it first. The State should buy or lease the fishing rights and dedicate them to the perpetual use of the people. The water and fish belong to the State and there must be some way provided for all its citizens to enjoy their use, if they so desire.

The expense of acquiring such rights will be considerable, and it will necessarily require a large force of wardens to patrol the streams and protect the landowner from intrusion on his property. To meet this expense, an additional charge of 25 or 50 cents on all licenses is suggested to be put into a separate fund for the purpose of purchasing rights.

License buyers will not object to this, but on the other hand, the entire State benefits by having good fishing in its streams, and there is no reason why the expense should not be generally distributed. A great deal of money changes hands every year just because people want to fish. There is scarcely any class of retail business that does not get some profit from it. It is one of the best drawing cards any State has for tourist trade. I imagine whole families very often get nice vacations because the man of the house knows there is a good fishing stream near the place they want to go.

It is hardly reasonable to suppose that resorts and fishing clubs are going to build their own hatcheries and raise fish for the streams. The State has to do it if it is done.

The States must take care of their fishing problems in a different way. There is a long season for fishing. It has an appeal for everybody. We think the only just and satisfactory plan is for the States to own the fishing rights and let everybody share in them.

Birds 'Talk' to McBryde and He Can Answer Them

THE average New Orleanian is likely to let shrill "chirp-chirp" of a sparrow or the vibrant treble of the mocking bird pass unnoticed. But when those plaintive notes reach the trained ears of a certain scholary gentleman with snow-white hair and sharp sensitive features, as he walks briskly up St. Charles avenue toward Tulane University, they do not go unheeded. Instead his face brightens with interest, he stops abruptly, and after listening intently for the infinite varieties in tone and pitch, purses his lips and sends forth the same beautiful melodies.

Dr. John M. McBryde, dean of the Tulane University graduate school and head of the English department, enjoys a reputation as a leading educator and a national authority on English literature and drama. But he also is recognized as an authority on birds, their habits and characteristics, and as an imitator of their songs.

The Tulane dean insists, however, that his information about birds is not as exact as it might be and that his information has not been gained through abstract, concentrated study, but largely as a result of a life spent in the highland country of the Blue Ridge and the Alleghenies.

Dr. McBryde is a veritable Pied Piper among the feathered folk and is able to gather about him as many as 20 or 30 mockingbirds simply by whistling.

"There is nothing remarkable about being able to imitate birds' notes," he maintains. "Almost anyone might do it. The trouble is that most individuals are too busy hurrying to and fro in endless confusion to visit the country, the parks or even to stop along the avenues so that they may hear the charming songs of these little warblers. It is a matter of simply training one's ears to catch their varied intonations and series of combinations, just as the musician's ears are attuned to the sounds of each delicate instrument in an orchestra."

Each morning and usually several times a day Dr. McBryde may be seen walking from his home at 1500 Jefferson avenue to his office in Gibson Hall. And if ever he can steal a few minutes from his many duties on the campus, he will cross over to Audubon Park and continue into its most secluded woodland, where, undisturbed, he can listen to the songs of his feathered friends. He chats with them in their own language and they answer him with their most enchanting melodies.

He imitates their calls and they come closer, so so that he is able to study them better. And it has been by this method, dating from his early boyhood, that Dr. McBryde has gained a knowledge of birds and their pecularities which has afforded him untold pleasure, he says, throughout his active life.

"There is a natural tendency for human beings to attribute to creatures of a lower order traits and characteristics which correspond to their own lives and habits, and if this is not carried to an extreme it makes every form of life far more interesting and significant," Dean McBryde explained. "However, there is a point beyond which we cannot go without entering a realm of uncertainty which has puzzled naturalists since the beginning of creation. We may speculate, but we must realize that it is speculation. And so, in the study of birds, we frequently notice in them characteristics and little mannerisms which set us to wondering whether, after all, we have not many things in common.

"The blue jay, for example, has a number of lovable traits, despite the fact that he is generally regarded as a thief and a ruffian. Besides his harsh cry of 'jay' he has a wealth of sweet notes, especially when courting, and he is a model husband.

"I have often seen the male jay relieve the female on the nest, while his wife goes out in search of food for the young ones. And like the crow he is given to hiding his food, frequently in holes in the ground, thus often causing trees and plants to spring up from forgotten stores of food."

Besides the English air gamin, according to the Tulane dean, there are 40 varieties of sparrows in this country, among these the sweet-voiced song sparrow.

Dr. McBryde thinks that in a range, variety, spontaneity, intensity, passion and power the voice of the mockingbird surpasses that of any other songbird in America or Europe, and he has studied that family probably more than any other.

"Unlike the song of the sparrow or that of the canary, which consists of a series of continuous trills with the notes running together so as to form a single prolonged monotonous sound, the mockingbird keeps each note separate and clear, with no slurs, and repeats every note some four or five times before he takes up another," he said.

"Archibald Rutledge, who has written charmingly of birds and beasts, declares that one particular mocker with which he was on familiar terms imitated the notes of 80 different birds, so that many consider the mockingbird to be a mere polyglot, an ornithological phonograph, catching and repeating the songs of other birds and having no song of his own. I have myself detected in the song of a mockingbird in Tennessee the notes of the jay, the sparrow-hawk, the cresteed tomtit, the cardinal, the kildee and the great crested flycatcher.

"In Knoxville I could hear a caged mocker that could whistle Captain Jinks of the Horse Marines. But I am inclined to think that the mocker's powers of imitation have been exaggerated and that it has a song of its own. The question might be asked whether, if the mocker were in a region where he could hear very few notes of other birds, his song, as a result, would be more limited in range and variety. But it seems to me that the mockingbird in New Orleans, with little opportunity to hear the rich chorus of the middle states, has nevertheless as fine a volume of song and as rich a variety as his more fortunate cousins in Tennessee and Virginia. The mockingbird, I am sure, would have his own rich song even if he had not other birds to imitate."

"Several years ago on the Tulane campus I saw a mockingbird that had lost his tail. He presented a very strange appearance and looked much like a diminutive owl. But the loss of his tail seemed to have caused no loss of self-respect nor of social prestige among his fellows. He made his home on the campus for two years, and then suddenly disappeared.

"Of all the birds in this part of the country, the mockingbird has, I think, the most interesting personality. Trim and neat in his coat of grey, he carries his tail (when he has it) with grace and skill, lifting it high above the wet grass or flirting it in anger. Born fighters, I have seen a pair of them in nesting time swoop down at a dog or a cat and drive the animal scurrying to shelter. And on the Tulane campus I've seen a pair of them dart after a squirrel on the ground and drive him in sheer desperation to a tree. I've had them even dart at my own head."

Birds, for the most part, are inclined to be clanish, Dr. McBryde declares. They usually stick to the members of their particular families. And when an owl or some strange bird does not meet with approval before their eyes, they will gather close aroupnd him and make things so disagreeable that he will fly away quickly.

Dean McBryde says the coming and going of birds during their spring migrations and their winter returns can be predicted within several days. They are never very late, and they journey high in the air all the way from Brazil and Central America to all parts of the United States.

As a youngster, he and his friends formed a club which they named after the scientist Agassiz. They shot birds, skinned them and hung them on the walls as decorations. Under each bird they would place a card with his Latin name. The red-headed woodpecker, for example, was labelled "Picus Erythrocephalus."

"And it is interesting to note that from that group there developed a man who later became head of the conservation department in South Carolina, Ben Taylor," he added.

At Tulane, Dr. McBryde, in addition to his administrative duties, is chairman of the faculty committee on publications, chairman of the faculty committee on debating and a member of the faculty committee on dramatics.—*Times-Picayune.*

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Areas Within National Parks Reserved For Scientific Study

Reservation of areas within the boundaries of national parks, where conditions will be maintained unmodified, so that geologic and biologic exhibits may continue to be available in primitive form for educational and scientific investigation purposes, was announced June 16 by Horace M. Albright, Director of the National Park Service of the Department of the Interior.

The restricted areas will be located in isolated sections of the parks where use of the park by the general public will not be interfered with, and admission will be granted by special permission only, the Director said. The Service's statement follows in full text:

A definite policy of preserving research reserves inside national park areas has been adopted by the National Park Service of the Department of the Interior, according to Horace M. Albright, park director.

It is true that the national parks themselves are areas preserved in as nearly possible their natural condition for the use of the people. The research reserves, however, carry the preservation a step further, for in them it is proposed to maintain conditions unmodified and free from external influences of any sort, in order that their geologic and biologic exhibits may continue to be available in primitive form for the purposes of education and scientific investigation.

The research areas will not be approached by roads or trails, and will be located in isolated sections of the national parks where they will neither interfere with the administration of the parks or with the use of the park by the public.

Admission to these special areas, whose location will not be announced generally, will be by special permission only, and then only for the purpose of making scientific studies or in connection with the administration of the tract. The wild animals and plants in these perpetual reserves will be left absolutely unrestricted unless some invasion from the outside should seriously disturb the natural balance.

The idea of having these special research areas inside the national parks is not new, as the first one was established in the Yosemite National Park, California, in 1926. Another was established in Mount Ranier National Park, Washington, in 1928. While further reserves of this nature have been planned for several years, actual designation has awaited the formation of a definite policy in the matter and the making of the necessary field examinations and studies.

GOD'S HAND

The stars that silver twilight's dusk He sets in place.
Then, with a gentle touch He doth erase
The thousand tints of mauve, and flame, and blue
Of sunset sky. A swift caress, and shallow ripples break
And shatter the still mirror of the lake.

The petals of the crimson rose He doth unfold.
His potent finger turns the buttercups to gold,
Paints bronze and purple on the pheasant's throat,
And spreads upon the moth's broad wing a gem
Like that which decks an angel's diadem.

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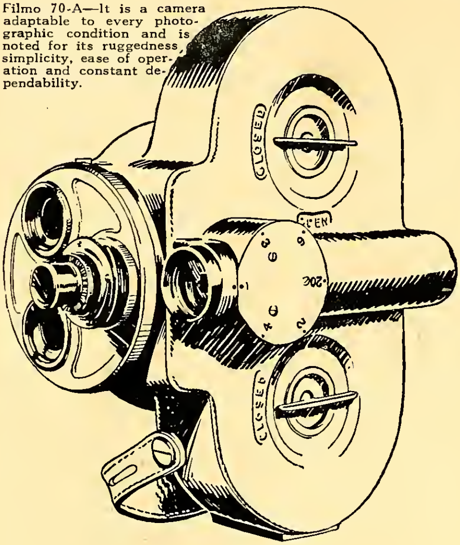

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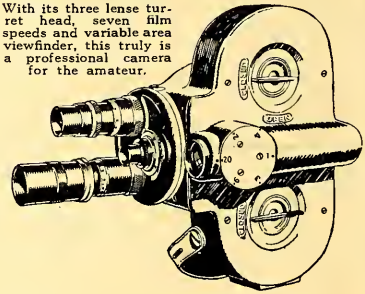

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